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EXECUTIVE OFFICE OF ENVIRONMENTAL
AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY
ENGINEERING



MASSACHUSETTS DEMONSTRATION OF
REASONABLE FURTHER PROGRESS

OZONE

1987

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DIVISION OF AIR QUALITY CONTROL

ONE WINTER STREET 8TH FLOOR
BOSTON, MASSACHUSETTS 02108

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THE MASSACHUSETTS DEMONSTRATION OF
REASONABLE FURTHER PROGRESS

OZONE

1987

Project Author

Kenneth Santlal

Project Manager

Robert Boisselle

SEPTEMBER 1988

Division of Air Quality Control
Massachusetts Department of
Environmental Quality Engineering
One Winter Street
Boston, Massachusetts 02108
Phone (617) 292-5630



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DIRECTOR
Bruce K. Maillet

TECHNICAL SUPPORT

Sarah Simon - Deputy Director

Information Systems

George Hailer
Adnan Charara

Modelling

Stephen Dennis

PROGRAMS

Barbara Kwetz - Deputy Director

Program Development

Laurel Jenney-Carlson
(Author 1980-1983 Reports)
Arthur Marin

Program Implementation

Donald Squires
Mike Scherer
Jerome Grafe
Gary Idleburg

REGIONAL STAFF

Western

Bob Vachula

Central

Gary Roscoe
Dennis Dalto
Maria L'Annunziata
Dana Nicol
Tom Cusson

Met. Boston/N. East

Weiskoff Kelley
William Vickers
John Mills
Ed Burke
Tom Natario

Southeast

Steve Risi
Jean Waters
Christine Flass

SECRETARIAL SUPPORT

Yvonne Willis-Lampley
Catherine Higgins

DEMONSTRATION OF RFP FOR OZONE (1987)

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1. INTRODUCTION

The Clean Air Act Amendments passed by the U.S. Congress in August, 1977, required that each state in the country determines whether or not it met health and welfare related standards for five major air pollutants: sulfur dioxide, carbon monoxide, total suspended particulates, nitrogen dioxide and ozone. States that had violations of federally-established standards for any or all of these pollutants were required to develop and adopt State Implementation Plans (SIPs) which included strategies adopted to attain and maintain the standards. EPA then approved these SIP's if they demonstrated expeditious attainment of the federal standards.

The Commonwealth of Massachusetts is one such state that had violations of the National Ambient Air Quality Standards (NAAQS) for ozone and carbon monoxide. The part D provisions in the Clean Air Act Amendments (CAA) of 1977 allowed the Commonwealth to obtain an extension of the 1982 attainment deadline providing certain requirements were met, including submission of a revised SIP. These plans must require reasonable further progress including emission reductions from existing sources.

The Clean Air Act defines Reasonable Further Progress (RFP) in Part D, Section 171 as follows:

Annual incremental reductions in emissions of the applicable air pollutant (including substantial reductions in the early years following approval or promulgation of plan revisions under this part and section 110(a)(2)(I) and regular reductions thereafter) which are sufficient, in the judgement of the Administrator, to provide for attainment of the applicable NAAQS by the date required in Section 172(a).

In 1982, Massachusetts submitted to the U.S. EPA the 1982 State Implementation Plan (SIP) for Ozone and Carbon Monoxide. The SIP represents the Commonwealth's revised plan to achieve ozone and carbon monoxide standards before the Clean Air Act Deadline of December 31, 1987. As part of the 1982 SIP, the Division of Air Quality Control (DAQC) of the Massachusetts Department of Environmental Quality Engineering (DEQE) made the commitment to track annual Reasonable Further Progress (RFP). RFP is, thus, a method of evaluating the adequacy of reductions in emissions over time. The Massachusetts SIP defines RFP as the linear trend extending from the emissions level in the base year to the emissions level projected to attain the National Ambient Air Quality Standards (NAAQS) for ozone in 1987.

This report, which covers calendar year 1987, is the final report demonstrating ozone RFP relative to the base year 1980 and the projections contained in the 1982 SIP. This report has been prepared by the Information Systems Branch of the DAQC.

Organization of the Report

This report concentrates on the pollutant ozone and is organized around three major inventory elements (Stationary, Area and Mobile) which emit volatile and non-methane organic compounds (VOC's and NMOC's). VOC's and NMOC's are precursors of atmospheric ozone formation.

Section 2, entitled Description of the Pollution Problem, addresses the pollutant ozone (O₃), its precursor pollutants, some monitoring data, its formation and the health and welfare effects related to high levels of ozone.

The Stationary Point Source Element section describes the data collection process and quality assurance review procedures used in developing the 1987 point source emissions inventory for Massachusetts. A summary of the point source inventory up to 1987 is presented. In addition, this section discusses the regulatory controls adopted by the Commonwealth and source compliance/emission reductions from these controls.

The Area Source Element presents the 1987 update of the Area Source Emissions Inventory prepared in the 1982 SIP including a discussion of the growth factors used pursuant to the release of the 1980 Census Data. This section also quantifies emission reductions from regulatory controls placed on area sources.

The Mobile Source Element describes the methods and sources used to develop a comprehensive Mobile Source Emissions Inventory for 1987. Also included is documentation of emission reductions from the implementation of various projects and programs designed to reduce mobile source pollution. This includes a report of the first five years (April 1983 to April 1988) of implementation of the automotive Inspection/Maintenance (I/M) program (Appendix C).

The final section, Demonstration of RFP 1980-1987 combines the inventory estimates of the three previously described elements relative to the three SIP analysis areas established in the 1982 SIP. The actual emissions and the SIP projected emissions targets from the three SIP areas are combined to provide a Statewide total.

II. DESCRIPTION OF THE POLLUTION PROBLEM

A. Pollutant Ozone

The pollutant ozone is the most prevalent of the photochemical oxidants; yet it is not directly emitted by point, area or mobile pollution sources. Ozone is created in the atmosphere by the reaction of precursor pollutants in the presence of sunlight and high temperatures. Non-methane organic compounds (NMOC) are precursors, and they include volatile organic compound (VOC) emissions from industry and Non-Methane Hydrocarbons (NMHC) from mobile sources. Strategies to reduce levels of ozone must control the emissions of the precursor NMOC.

Ozone is primarily a summer season problem and is not limited to urban areas. Since it takes time for the precursor pollutants to react in the presence of sunlight and high temperatures to form ozone, ozone pollution is transported, and high levels may affect populations 50-100 miles from the source of the precursor emissions.

B. Health and Welfare Effects of Ozone

The primary NAAQS for ozone, established to protect public health, has been set at .12 parts of ozone per million (ppm) parts of air for a one-hour period. The standard is attained when the expected number of days per year with maximum hourly average concentrations above .12 ppm at a given site is less than or equal to one (40 CFR 50.9 Appendix H). The secondary standard which is protective of public welfare, is the same level as the primary standard. The number of days each site recorded levels above the standard (exceedances) from 1980 to 1987 is listed in Table II-1. These exceedances are summarized by SIP analysis areas and are presented in Figures II-2 and II-3.

Ozone is primarily a respiratory irritant and can cause mechanical changes in the lungs which impair breathing, particularly, when performing heavy, physical exercise. Population groups at a high risk include those with conditions such as asthma, bronchitis, emphysema, and heart disease as well as children, elderly, and pregnant women. Some of the symptoms caused by ozone exposure are headaches, coughing, chest discomfort, eye irritation, and breathing difficulty.

Biomedical evidence of ozone toxicity suggests that ozone also causes systemic effects. These potential effects involve the influence of ozone on producing breaks in chromosomes of certain white blood cells, namely the circulating lymphocytes of laboratory animals and humans, and the possibility of ozone damage to red blood cells. Also, an increased susceptibility to respiratory infection has been demonstrated in laboratory animals.

Eye irritation is a symptom that is frequently associated with high ozone levels; however, this is due to photochemical oxidants other than ozone, such as peroxyacetyl nitrate (PAN) and aldehydes. When ozone levels are high, the levels of these pollutants are usually high as well.

In addition to human health effects, there also are harmful welfare effects on vegetation and physical structures. This can be observed not only by damage to leaves and flower petals, but by a decrease in yield as well. Plants which are especially sensitive include tomato, beans, onions, barley, wheat, cotton, corn, pine and oak trees. Adverse effects on materials include aging or cracking of rubber and the fading of dye in fabrics. Ozone is also responsible for the peeling and cracking of painted surfaces.

Photochemical oxidants alone and in combination with other pollutants, are known to cause damage to plants and may play a significant role in the current European and North American forest decline phenomena (Skarby, 1984; Ashmore, 1985). Ozone (O_3) and other oxidants such as peroxyacetyl nitrate (PAN) cause visible injury to many plant species found in natural communities. Treshow (1973) has shown that several common plant species, including common grass, red spruce, a species of oak, white pine, and quaking aspen, were injured by a single two-hour exposure to 0.15 ppm ozone in a series of fumigation chamber experiments. He postulated that lower concentrations of ozone at prolonged or repeated exposures may impair growth and affect community vigor and stability.

Recent experiments carried out in New England demonstrate that ambient ozone concentrations cause significant reductions in the growth of sapling poplars (Wang and Borman, 1986). Reductions in height growth occurred without visible symptoms of foliar injury and at ozone concentrations below the NAAQS. Ozone damage has also been detected on vegetative crops in the Connecticut River Valley of Massachusetts for the past twenty years. Ozone continues to be a regional pollutant of concern, with wide ranging impacts to numerous plant species in Massachusetts.

C. 1982 SIP Emissions Reductions

The Clean Air Act Amendments of 1977 required each state to include in its revised SIP an inventory of air pollutant emissions for the base year 1980 and a projected 1987 inventory. The purpose of the VOC emissions inventory is to identify the number of sources, the emitting processes, the emissions levels and, if applicable, the levels resulting from existing and projected control techniques.

For RFP analysis, as outlined in the 1982 SIP, the six Massachusetts Air Quality Control regions are combined into three urban regions referred to as "SIP Analysis Areas" (Figure II-4). The Springfield SIP Analysis area is the Berkshire and Pioneer Valley Regions. The Boston SIP Analysis Area represents the Met. Boston, Merrimack Valley, and Southeast Regions. The Worcester SIP Analysis Area represents the Worcester Region.

As recommended by the EPA, the Empirical Kinetic Modeling Approach (EKMA) together with the Ozone Isopleth Plotting Package (OZIP) was the attainment demonstration modeling procedure used to determine target NMOC emission reductions for the SIP analysis areas. The conceptual basis of this procedure is the Lagrangian Model OZIP which simulates the production of ozone from precursors within a migrating column of air. The results of this analysis indicated that 1980 to 1987 NMOC emissions reductions of 35, 40, and 35 percent for the Boston, Worcester and Springfield SIP analysis areas, respectively, would be adequate to achieve the ozone standard.

These reductions have been periodically reviewed by the DEQE to ensure that they will be sufficient to meet projected emission levels set in the SIP. For purposes of RFP, a 1980 emissions baseline was established using 1979 stationary, area and mobile source emissions inventories. (1982 State Implementation Plan: Appendix A).

The RFP Summary is calculated in kilograms per day each year as outlined in the SIP. Since the point source inventory is calculated and tracked in tons per year, it is converted to kg/day. This is illustrated by the formula:

$$\frac{\text{ton per year (2000 lbs.)}}{365 \text{ days}} \times \frac{(\text{.4536}) \text{ kg}}{\text{ton}} = 2.4854 \frac{\text{kg}}{\text{day}}$$

D. Historical Ozone Air Quality Data 1980 to 1987

The Massachusetts Department of Environmental Quality Engineering (DEQE) maintained thirteen ozone monitoring stations across the state in 1987. The ozone season covers seven months of monitoring from April to October. The network has been approved by EPA in accordance with siting and other requirements of 40 CFR 50. Massachusetts publishes an annual Air Quality Report that includes complete information on ozone levels monitored by the state ambient network.

There were fewer exceedances of the National Ambient Air Quality Standard (NAAQS) in 1987 than in 1980 (Table II-1), but there were fewer ozone monitors in 1987 than in 1980.

TABLE II-1

OZONE EXCEEDANCE DAYS BY SIP ANALYSIS AREA 1980-1987

REGION -----	1980 -----	1981 -----	1982 -----	1983 -----	1984 -----	1985 -----	1986 -----	1987 -----
SPRINGFIELD	17	15	18	45	17	13	8	1
WORCESTER	13	5	1	4	2	3	0	0
BOSTON	72	5	26	41	28	18	7	10
<u>STATEWIDE</u>	<u>102</u>	<u>25</u>	<u>45</u>	<u>90</u>	<u>47</u>	<u>34</u>	<u>15</u>	<u>11</u>
% REDUCTION FROM 1980		75%	56%	12%	54%	67%	85%	89%
NO. OF SITES	19	15	13	16	15	14	11	13
MEAN EXCEEDANCE PER SITE	5.4	1.7	3.5	5.6	3.1	2.4	1.4	0.85

FIGURE II-2

OZONE EXCEEDANCE DAYS BY SIP AREA

1980 TO 1987

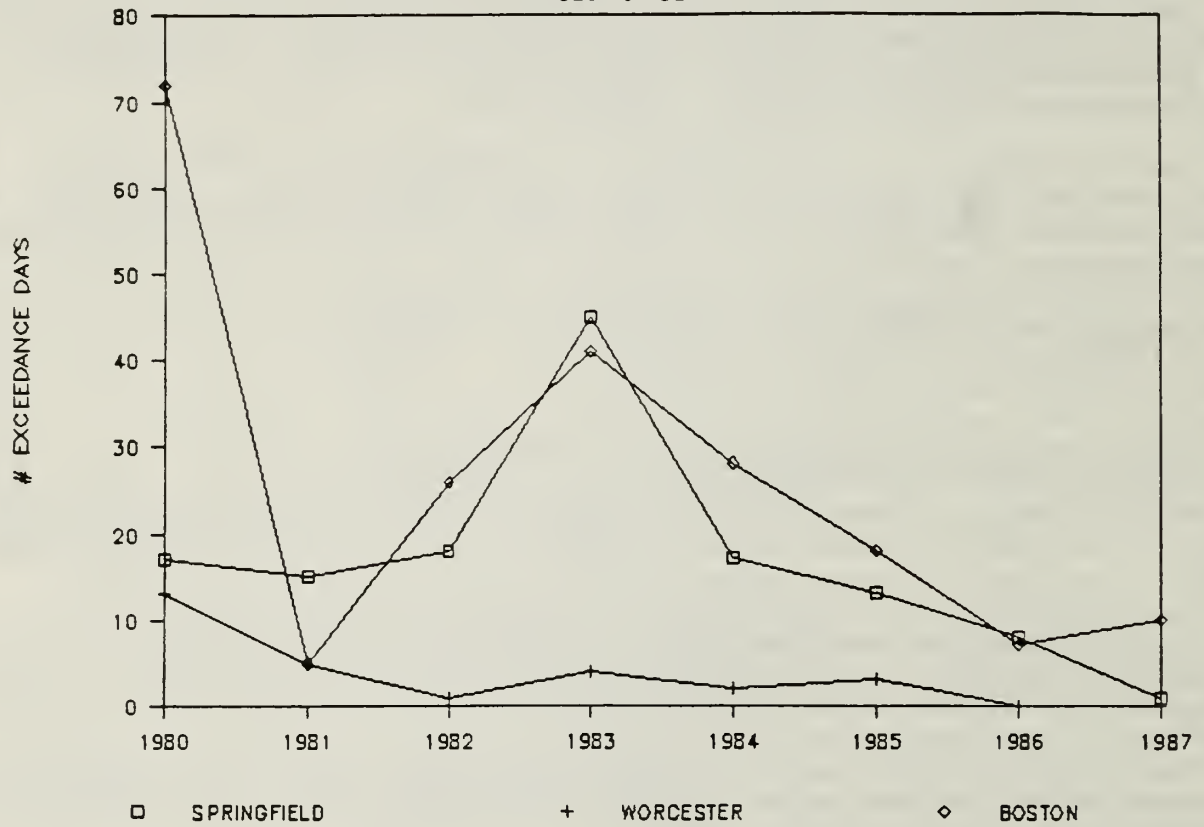


FIGURE II-3

MEAN EXCEEDANCE DAYS PER SITE 1980-87

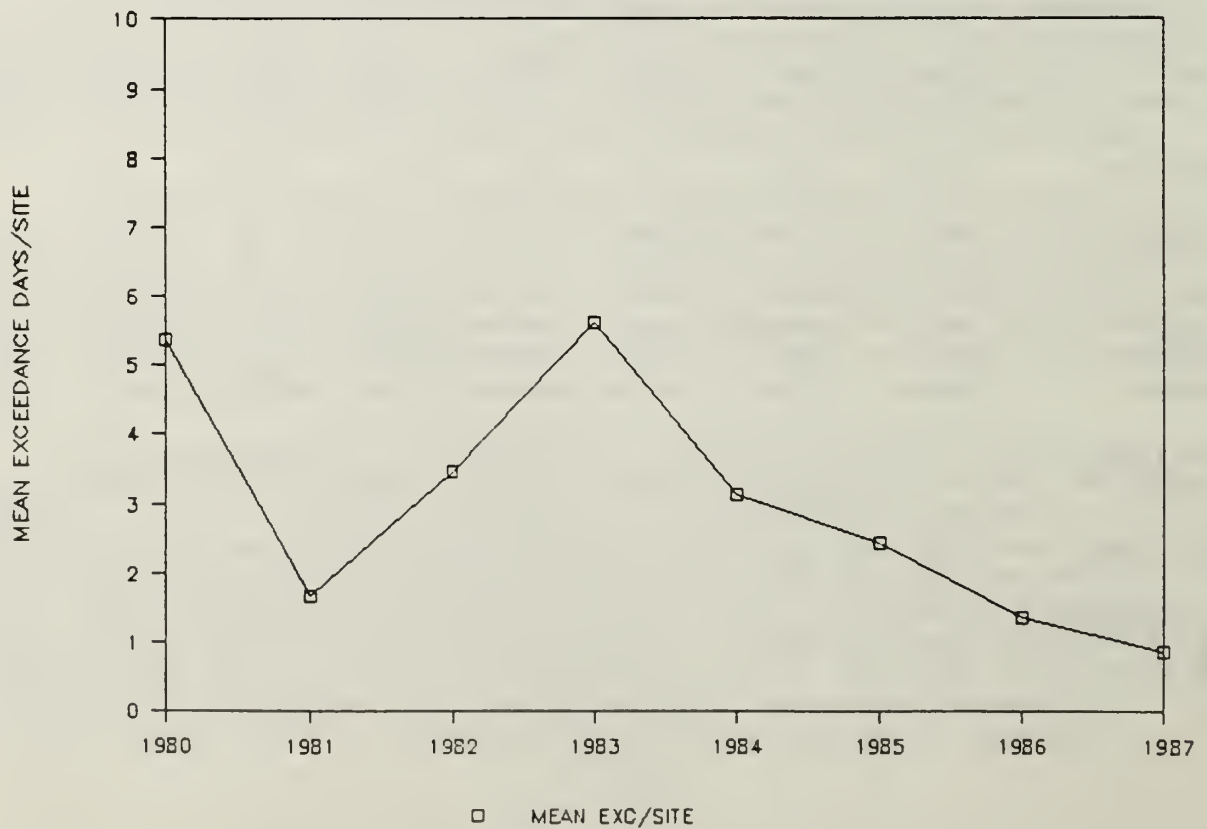
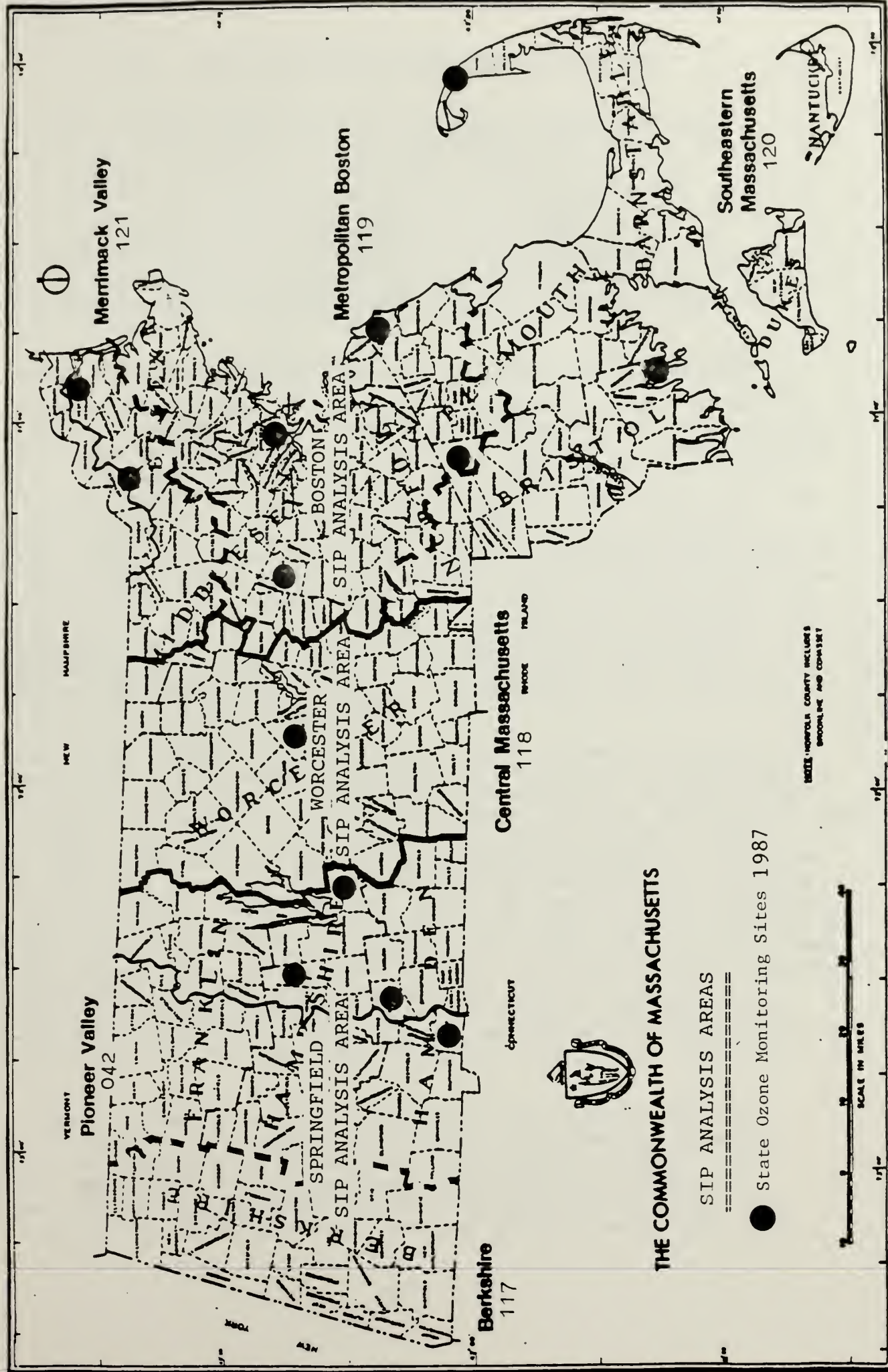


FIGURE II-4 MASSACHUSETTS SIP ANALYSIS AREAS
AND OZONE MONITORING SITES 1987



III. THE STATIONARY POINT SOURCE INVENTORY

In this section, the inventory of actual emissions from stationary point sources of VOC is addressed. Stationary sources of VOC, are primarily industrial processes, storage, or other commercial/industrial establishments which use significant quantities of volatile organic compounds. Although the EPA traditionally considers a facility which emits 100 tons per year or more as a point source, and all others as area sources, a stationary point source in this inventory is defined as any facility that has been identified and registered with DEQE as a source emitting more than 3.5 tons of VOC per year (8.7 kg/day).

B. Stationary Source Enforcement and Inventory System (SSEIS)

The inventory system now used in Massachusetts for the VOC inventory is a computerized, "menu-driven" data base of point source information called the Stationary Source Enforcement Inventory System (SSEIS). The purpose of SSEIS is to track point source emissions data, annual registration inspections and fees, plant compliance and enforcement activity. Information from SSEIS is used for DAQC technical support, program planning, inventory development and source tracking. This system can calculate emission estimates based on a table of emission factors, source process type and material/fuel used each year, but regional staff often enter their own, more source specific, manual emission calculations. For example, combustion VOC emissions were based on the amount and type of fuel and Source Classification Codes (SCC) for each type of boiler or furnace as reported on the registration forms. The emissions were calculated by SSEIS using AP-42 emission factors.

Every year, DEQE mails registration forms to major sources that emit more than 100 tons per year, and every three years for minor sources below that level. After source inspections, regional staff enters data into SSEIS which calculates and/or records emissions. One third of the minor sources are registered each year and in this manner, the point source inventory is completely updated every three years. Some VOC emissions are manually calculated and are directly entered into SSEIS. SSEIS stores 5 years of historic plant emission summary by pollutant beginning with 1983 data, the year of record when the SSEIS data base went into operation. By 1988, the historic plant emission summary data for the most recent five years will be available on SSEIS. The 1979-1982 VOC inventory was derived from the 'forerunner' of SSEIS called the Emissions Inventory/Point Source (EIS/PS). In the EIS/PS system, all VOC emissions were calculated by the regional staff for each point of emission within an individual source.

General guidelines for all VOC point source emissions were derived from the EPA document "Procedures for Emissions Inventory Preparation., Vol. II: Point Sources (EPA 450/4-81-026b)". In addition, emissions were calculated using the emission factors outlined in EPA's "Compilation of Air Pollution Emission Factors, Vol. 1 Stationary Point and Area Sources" 4th Ed. Sept. 1985, and

Supplement A, October 1986. In select cases, full source descriptions were obtained from the Emissions Inventory/Source Registration forms in order to locate and correct entry and calculation errors. Quality assurance and edit functions built into SSEIS data entry programs have ensured that the point source inventory contained herein is as accurate as is feasible.

In addition to the SSEIS quality assurance checks, the source registration list is expanded and upgraded by the regions each year as sources are discovered and inspected. As a result, the 1987 inventory includes emissions from many sources that were not registered in the 1980 to 1982 inventory. The SSEIS VOC emissions calculations for the largest point sources were reviewed by regional staff before their inclusion in this 1987 RFP report. The 1987 inventory also includes a large proportion of point source emission calculations computed individually by regional staff instead of the more generic estimation method performed automatically by SSEIS. Appendix A is a detailed listing of the 1981 to 1987 point source inventories.

C. Regulated Sources and the Point Source Inventories

The DEQE adopted regulations in the 1979 and 1982 SIPs for the control of VOC emissions from stationary sources. Table III-1 lists the point and area source categories for which there are regulations controlling emissions from VOC sources. The 1987 Compliance Status report is attached as Appendix B.

Due to economic growth, the total annual inventories for some source categories (eg. chemical manufacture, plastic products) have increased since 1980. In addition, inventory corrections for newly discovered miscellaneous sources less than 100 TPY account for a large proportion of this category's increase.

Table III-2 through III-4 summarize the point source emissions, net change from 1980 to 1987, and the point source target emissions for the SIP analysis areas. Table III-5 and Figure III-6 summarize the previous three tables and illustrate the point source emissions inventories from 1980 to 1987, their corresponding SIP projections and their differences.

TABLE III-1

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING REGULATIONS FOR THE
CONTROL OF VOLATILE ORGANIC COMPOUNDS

310CMR 7.18

- (3) Metal Furniture Surface Coating
- (4) Metal Can Surface Coating
- (5) Large Appliance Surface Coating
- (6) Magnetic Wire Insulation
- (7) Automobile Surface Coating
- (8) Solvent Metal Degreasing
- (9) Cutback Asphalt
- (10) Metal Coil Coating
- (11) Surface Coating of Miscellaneous Metal Parts
- (12) Graphic Arts - Packaging Rotogravure, Flexogravure
- (13) Dry Cleaning Systems
- (14) Paper Surface Coating
- (15) Fabric Surface Coating
- (16) Vinyl Surface Coating
- (17) RACT
- (18) Polystyrene Resin Manufacture
- (19) SOCFI

310 CMR 7.02

- (12) Distribution of Motor Vehicle Fuel (Gasoline Marketing)

TABLE III-2

BOSTON SIP ANALYSIS AREA - POINT SOURCES
VOC EMISSIONS - KG/DY

CATEGORY	# SOURCES 1987	1980	1981	1982	1983	1984	1985	1986	1987	NET % CHANGE 1980- 1987
Misc.>100t	6	12281	12653	12981	12951	11619	11711	9897	7394	-39.8%
Paper Coat	18	26437	16038	18598	18568	13307	10227	8726	5162	-80.5%
Gas. &Crud	14	9964	11286	11821	12770	10451	7737	8368	9221	-7.5%
Fabric Coa	17	32698	21374	18352	18059	16724	8440	8326	6857	-79.0%
Degreasing	19	829	920	952	954	880	669	572	500	-39.7%
Chem.Manuf	13	3374	1834	1829	1715	2610	1377	2088	1218	-63.9%
Misc.Met.	13	2572	1526	1295	1300	1700	1553	1208	1029	-60.0%
Adhesive	6	216	333	348	350	323	191	191	184	-14.8%
Metal Furn	1	744	201	206	209	109	142	104	104	-86.0%
Auto Assem	1	6511	3480	2331	2301	6057	5001	5398	2287	-64.9%
Coat.Can	2	1399	1126	1203	1178	311	666	865	594	-57.5%
Dry Clean.	45	803	1312	1255	957	1263	992	999	1056	31.5%
Plastic Pr	2	136	164	149	149	147	127	127	119	-12.5%
Wood Furn.	2	139	129	109	104	104	62	99	85	-38.8%
Coat. Met. Coils	1	541	55	45	45	199	40	37	47	-91.3%
Vinyl Coat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnet.Wir	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Misc.<100t	498	5296	9795	14545	15012	22530	25639	27451	21553	307.0%
TOTAL	658	103940	82226	86019	86622	88334	74574	74457	57410	-44.8%
Total SIP Projected		103563	102890	95707	95033	94357	57282	56588	55915	-46.0%

pt87bos

TABLE III-3

WORCESTER SIP ANALYSIS AREA - POINT SOURCES
VOC EMISSIONS - KG/DY

CATEGORY	# SOURCES 1987	1980	1981	1982	1983	1984	1985	1986	1987	NET % CHANGE 1980- 1987
Misc.>100t	1	3304	3753	3673	3649	2553	2050	2050	1079	-67.3%
Paper Coat.	3	12959	11010	11264	11164	5207	4953	989	338	-97.4%
Gas & Crude	1	104	104	104	104	104	104	104	97	-6.7%
Fabric.Coat.	2	841	1029	634	621	254	70	10	231	-72.5%
Degreasing	4	390	885	728	733	263	70	278	191	-51.0%
Chem.Manuf.	11	3050	2508	2513	2463	1804	1573	2637	1419	-53.5%
Misc.Metal	2	258	104	112	112	112	0	0	229	-11.2%
Adhesive	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metal Furn.	2	63	62	60	60	60	137	117	67	6.3%
Auto Assem.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coat. Cans	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dry Clean.	2	209	199	199	209	209	109	109	0	-100.0%
Plastic prod	2	109	609	599	587	162	162	246	201	84.4%
Wood Furn.	6	1155	1039	967	1469	1360	1245	1419	1454	25.9%
Coat Metal Coils	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Coat.	2	3319	3654	3261	3231	3238	3258	3027	1973	-40.6%
Magnet.Wire	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Misc.<100t	67	512	1171	1156	3328	3403	3502	3773	3621	607.2%
TOTAL	105	26273	26127	25270	27730	18729	17233	14759	10900	-58.5%
Total SIP Projected		26358	26420	26482	26544	26606	12744	12806	12867	-51.2%

pt87worc

TABLE III-4

SPRINGFIELD SIP ANALYSIS AREA - POINT SOURCES
VOC EMISSIONS KG/DY

CATEGORY	# SOURCES 1987	1980	1981	1982	1983	1984	1985	1986	1987	NET % CHANGE 1980- 1987
Misc.>100t	0	2242	790	882	758	159	159	159	0	-100.0%
Paper Coat.	24	29785	28458	27029	26139	21531	15902	8291	6333	-78.7%
Gas & Crude	1	162	176	241	241	229	229	258	137	-15.4%
Fabric.Coat.	4	2562	2013	1934	1929	1069	1255	669	619	-75.8%
Degreasing	5	481	423	360	365	400	375	375	296	-38.5%
Chem.Manuf.	3	2991	4113	4687	4645	6616	3425	1551	1056	-64.7%
Misc.Metal	8	4001	4076	3544	3497	4924	1968	1305	979	-75.5%
Adhesive	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metal Furn.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Auto Assem.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coat. Cans	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dry Clean.	20	319	626	604	604	477	495	452	368	15.4%
Plastic prod	2	69	70	72	70	134	94	94	94	36.2%
Wood Furn.	0	122	122	119	117	117	117	0	0	-100.0%
Coat Metal Coils	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl coat.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnet.Wire	0	32	27	30	30	30	323	0	0	-100.0%
Misc.<100t	70	1278	1461	1471	1474	2662	2595	2247	1854	45.1%
TOTAL	137	44044	42355	40973	39869	38348	26937	15401	11736	-73.4%
Total SIP Projected		44400	44753	42372	42451	43075	28923	29549	30173	-32.0%

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TABLE III-5

VOC POINT SOURCE EMISSIONS 1980-1987
BY SIP ANALYSIS AREAS (KG/DAY)

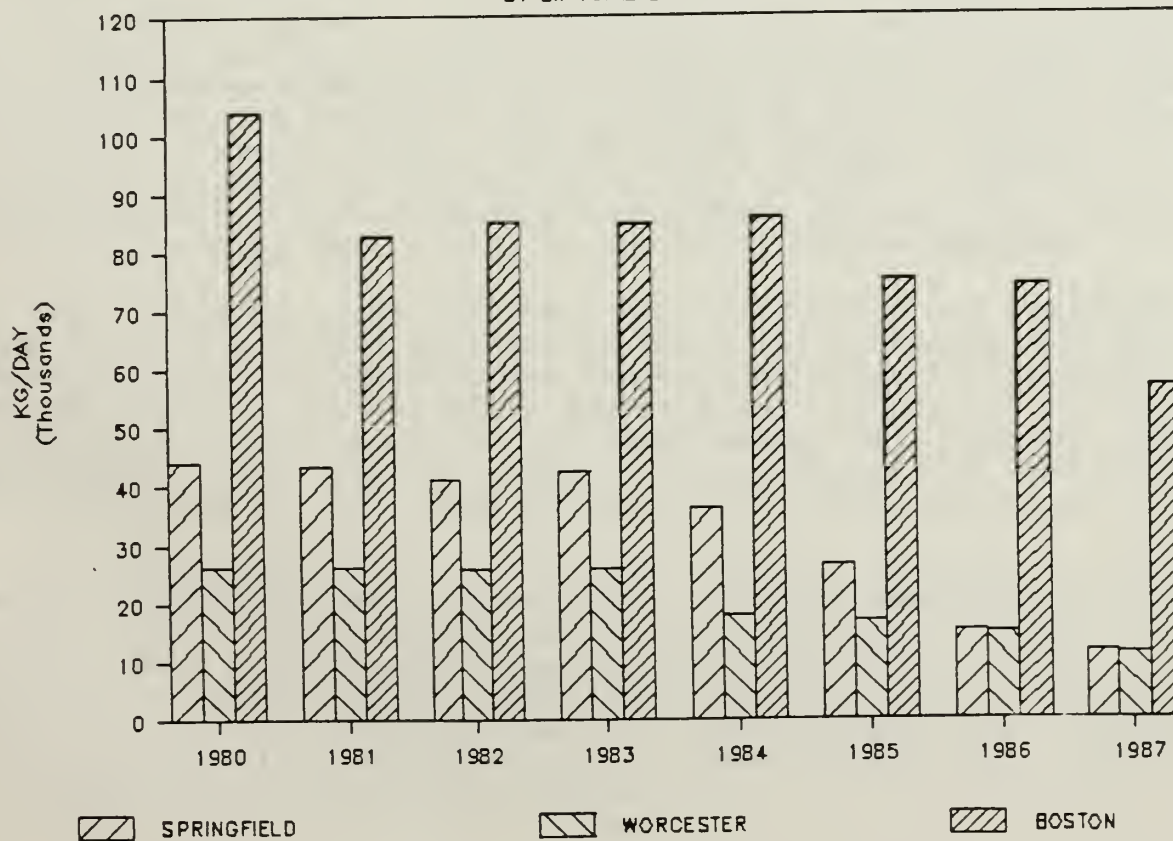
SIP ANALYSIS AREA	1980	1981	1982	1983	1984	1985	1986	1987
SPRINGFIELD	44044	42355	40973	39869	38348	26937	15401	11736
WORCESTER	26273	26127	25270	27730	18729	17233	14759	10900
BOSTON	103940	82226	86019	86622	88334	74574	74457	57410
ACTUAL EMISSIONS	174257	150708	152262	154221	145411	118744	104617	80046
SIP PROJECTED EMISSIONS	174321	174063	164561	164028	164038	98949	98943	68782

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FIGURE III-6

POINT SOURCE EMISSIONS 1980-1987

BY SIP ANALYSIS AREAS





IV. THE AREA SOURCE INVENTORY

A. Introduction - Estimation Methods

1.1 Purpose

This section documents the development of the Massachusetts area source emissions inventory for VOC as prepared by the Department of Environmental Quality Engineering (DEQE), Division of Air Quality Control. Area sources include non-highway mobile sources and stationary sources that are too small and/or too numerous to be treated individually as point sources. Table IV-1 lists the categories used for calculating the area source VOC emissions.

1.2 Description of Area Emission Estimation Methods

This inventory includes certain categories that include both point and area sources. In the 1982 Ozone SIP, area source estimates were calculated by EPA recommended methods. For almost every category, these methods base emissions from smaller sources on population figures. Several source categories included in the area inventory also contain point sources. Since DAQC includes emissions from point sources as small as 3.5 tons per year in the point source inventory. Emissions from the sources less than 100 tons per year were subtracted from the area source emission totals. This adjustment was most significant for three categories: Other Solvent Use, Industrial Processes and Surface Coating and Other Miscellaneous Sources. The area source inventory, therefore, was specifically adjusted to estimate only the emissions of the numerous small point sources which emit less than 3.5 tons per year.

In order to prevent double counting and to maintain a consistent point source inventory, in the subsequent inventories, the adjusted area source emissions were used as a starting point. Rather than recalculating area emissions and subtracting out the small source emissions, a "growth factor" was developed based on changes in population or fuel use and applied to the original, adjusted area source estimate. This procedure compensates for the small sources in the 1980 inventory that appear in the point source listings.

Small point sources that have been discovered and registered since the 1982 SIP were included in the original EPA-recommended, area source estimate. Since DAQC now has more detailed information on these sources through the SSEIS registration process and includes them in the point source inventory, the degreasing, dry cleaning, and miscellaneous metal part emissions of newly registered sources have been subtracted from the area estimates for these categories for 1987.

For each category, the emissions shown are typical of an average weekday during the summer ozone season, and are expressed in kg/day. The base year is 1980 and the year of RFP reporting is 1987, accounting for growth and implementation of controls adopted as part of the 1979 and 1982 SIPs. Regulations adopted by the Division of Air Quality which affect area source emissions include Stage 1 gasoline marketing controls, cutback asphalt, solvent degreasing, dry cleaning and miscellaneous metal parts coating.

TABLE IV-1 AREA SOURCES OF VOC REGULATIONS

Gasoline Distribution

Non-industrial Surface Coating

Architectural Coatings
Auto Refinishing

Other Solvent Use

Degreasing
Dry Cleaning
Graphic Arts
Cutback Asphalt Paving
Commercial/Consumer Solvent Use
Adhesives

Industrial Processes and Surface Coating

Plastic Parts Manufacturing and Painting
Metal Furniture
Wood Furniture
Miscellaneous Metal Parts
Chemical Manufacturing

Other Miscellaneous Sources

Stationary Source Fuel Combustion
Forest, Agricultural, and Other Burning
Pesticide Application

Non-highway Mobile Sources

Off-highway Vehicles
Railroad Locomotives
Aircraft
Vessels

Several documents provide basic guidance for the development of the area source emission inventory. The primary source was the "Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume I, Second Edition EPA-450/2-77-028 (1980)." Emission factors were generally taken from AP-42 and appropriate Control Technology Guidelines (CTG's). Basic demographic and employment data for base year 1980 and the RFP demonstration year of 1987 are from the revised DEQE Growth Factor Files and appear in Table IV-2. All references are listed at the end of this report.

1.3 Growth Factor File

For the 1982 to 1987 RFP reports, the area source growth factor file underwent a major revision in order to include the 1980 U.S. Census of Population and 1985-1990 Population Projections developed by the Massachusetts Department of Public Health.

For the 1987 RFP report, the projected demand for combustion fuels was re-examined. Where appropriate, the U.S. Department of Energy (DOE) price projections were used to estimate future demand for the various fuels. Projections were made through economic analysis with statistical reinforcement. Projections also differentiated between residential, commercial and industrial energy demands.

TABLE IV-2
AREA SOURCE STATISTICS AND REVISED GROWTH FACTORS

<u>POPULATION</u> <u>AQCR</u>	Growth Factors					
	<u>1960</u>	<u>1970</u>	<u>1980</u>	<u>1980-82</u>	<u>1982-87</u>	<u>1980-87</u>
BERKSHIRE	142,135	149,402	145,110	1.0026	1.0029	1.0051
PIONEER VALLEY	584,703	639,280	642,932	1.0026	1.0029	1.0051
CENTRAL MASS.	613,666	672,127	681,436	.965	.95	.917
MET BOSTON	2,713,756	2,964,294	2,904,913	1.0021	.996	.998
SOUTHEAST	601,972	710,096	816,777	1.0257	1.0611	1.088
MERRIMACK VALLEY	492,346	553,971	545,869	.99	.999	.99
STATEWIDE	5,148,578	5,689,170	5,737,037	1.0001	1.0018	1.0018

<u>HOUSING</u> <u>AQCR</u>	# DWELLINGS			Growth Factors		
	<u>1960</u>	<u>1970</u>	<u>1980</u>	<u>1980-82</u>	<u>1982-87</u>	<u>1980-87</u>
BERKSHIRE	45,392	49,568	59,245	1.0199	1.0487	1.069
PIONEER VALLEY	182,966	205,366	239,360	1.0155	1.058	1.074
CENTRAL MASS.	189,387	211,906	252,491	1.0131	1.0617	1.075
MET BOSTON	842,163	953,151	1,097,557	1.0182	1.0571	1.076
SOUTHEAST	199,368	242,404	355,835	1.0110	1.1087	1.120
MERRIMACK VALLEY	151,316	176,633	203,658	1.0243	1.0627	1.088
STATEWIDE	1,610,591	1,839,028	2,208,146	1.0168	1.0663	1.084

SOURCE: 1980 U.S. Census of Housing, 1980 U.S. Census of Population
Dept. of Public Health, 1985 and 1990 Population Projections

B. Area Source Inventory Element

The following is a brief description of the 1987 update methodology for each area source category. The total emissions due to area sources are then presented in a table format. Like the point source inventory, the area source inventory is divided among the six Massachusetts Air Quality Control Districts, as defined by DEQE. The six Districts are later summarized by the appropriate SIP analysis area for the purpose of demonstrating RFP.

2.1 Gasoline Distribution

Evaporative emissions from gasoline distribution are broken down into four sub-categories. These sub-categories are: 1) Tank truck unloading (Stage I), 2) vehicle fueling (Stage II), 3) underground tank breathing losses, and 4) evaporative losses from trucks in transit.

Gasoline Distribution emissions were calculated based on gasoline sales figures obtained from the Massachusetts Department of Revenue. The figures were seasonally adjusted to account for higher gasoline usage during the ozone season, similar to the methodology used in the 1982 SIP inventory.

Since the 1982 SIP, however, controls have been installed for the Pioneer Valley, Metropolitan Boston, Central, Southeast and Merrimack Valley AQCRs in gasoline evaporative emissions due to compliance with the state's Stage I vapor recovery regulation (310 CMR 7.02(12)(b)).

All other categories of gasoline distribution emissions were calculated based on the growth in gasoline sales.

2.2 Non-Industrial Surface Coating

Architectural surface coating and automobile refinishing are major non-industrial surface coating source categories and were inventoried as area sources.

Both categories were inventoried in the 1982 SIP on an emissions per capita basis as recommended in EPA's "Procedures for the preparation of Emission Inventories for VOC's" Volume I 2nd ed. EPA-450/2-77-028. In this report the total 1987 emissions were calculated through use of the 1980 U.S. Census of Population and adjusted growth factors for the year 1987.

2.3 Other Solvent Use

a. Degreasing

Degreasing emissions included in the area source inventory are total emissions calculated on a per capita basis with the point sources that emit less than 100 tons of VOC per year subtracted out to avoid double counting.

The method used in calculating 1980 area source emissions in the SIP is the same as that used for the 1987 RFP Report. Two major changes have occurred in this category since 1980: the implementation and enforcement of 310 CMR 7.18(8)(a, b and c) and the implementation of a voluntary educational small-degreaser control program. This regulation requires Reasonably Available Control Technology (RACT) for all cold cleaning degreasers on or after December 31, 1980. According to the CTG for this source, implementation of RACT should bring about a 50% reduction in emissions. The 1987 area source figures for degreasers reflect the impact of the regulation. Reductions from the voluntary small degreaser control program were difficult to quantify at this time so they were omitted from the 1983 to 1987 RFP calculations.

b. Dry Cleaning

The methodology for estimating area source emissions from dry cleaners is the same as that contained in the 1982 SIP with modifications due to use of the 1980 U.S. Census of Population as a population base. Effects of the regulation to control dry cleaning emissions (310 CMR 7.18(13)) was not assumed in 1982 due to a number of extensions granted by the regions to dry cleaning establishments. However, in 1983, enforcement of the regulation was stressed and the area source emissions from dry cleaning were adjusted to reflect the increased participation in the program. It was assumed in the 1982 SIP that 65% of the dry cleaning operations would be controlled due to implementation of the regulation.

c. Graphic Arts

The methodology for estimating 1987 emissions from graphic arts facilities is the same as that used in the 1982 SIP for the 1980 inventory, with adjustments due to use of 1980 U.S. Census of Population.

d. Cutback Asphalt Paving

On May 1, 1982, section 7.18(9) of the "Regulations" took effect, thereby prohibiting the application of cutback asphalt for paving purposes during the ozone season. The Department predicted a 95% reduction in the 1980 emissions from cutback asphalt by 1987. Due to the "newness" of the regulation and based on enforcement efforts, a 70% reduction was assumed for the first year of the program. According to results of a survey of cutback asphalt suppliers and

communities, as well as spot checks, the 1987 area source emissions reflect a 90% reduction in emissions from 1980.

e. Commercial/Consumer Solvent Use

Emissions from this category are based on emissions per capita factors. The methodology for calculating 1987 emissions is the same as that used in the 1980 SIP with modified population figures based on growth factors.

f. Adhesives

The methodology for calculating 1987 emissions from adhesives is the same as that used in the 1982 SIP.

2.4 Small Industrial Processes and Surface Coating

Although most sources within this category will appear on the point source inventory, there are many small sources which will contribute to the total VOC emissions in the state and are included in the area source inventory. This category inventories those industrial processes and coating operations using the methodology called for in Volume I. The sources are: plastic parts manufacturing and painting, metal furniture coating, wood furniture coating, miscellaneous metal parts, and chemical manufacture.

In all cases, the emissions were determined by applying an emissions per employee factor to total employment as described in the 1982 SIP. Some additional research was conducted in conjunction with work done on point source surface coaters to verify the emissions factors and methodology used in the 1982 SIP.

The 1980 total of gallons of coatings sold in Massachusetts was obtained from the Sales Survey of National Paint and Coating Association. From field observation and information gathered from the point source registration, it was determined that the average portion of volatile compounds in use as opposed to total amount of coatings equals 58%. A composite emission factor for industrial coatings was derived from AP-42. The statewide emissions for all industrial process coating were determined to be 35,383 kg/day in 1980 which closely replicates the number presented in the SIP for this category and provides a "double-check" of the emissions per employee factors developed for Massachusetts.

The 1980 emissions for this category and all sub-categories were "grown" to 1987 based on trends and projections of manufacturing employment by two digit SIC growth factor which is industry specific.

2.5 Other Miscellaneous Sources

a. Fuel Combustion

This source category includes small boilers, furnaces, heaters, and other heating units too small to be considered point sources. The types of fuels used in Massachusetts are: coal, oil, natural gas, liquified propane gas, and wood. They are used as fuels by residential, commercial/institutional, and industrial consumers.

Emissions from fuel burning were established for this report by the same method as that used in the 1982 SIP. Updated fuel use figures were obtained from the American Gas Association's Gas Facts, the Department of Energy Sales of Fuel Oil & Kerosine, and the Energy Data Report entitled Coal Distribution January-December 1980: Massachusetts, the Department of Energy "State Energy Data Report 1960-1987 for Massachusetts. Growth factors applied are specific to the fuel and use. Although included here, most small fuel users have no emissions on a typical summer day.

b. Open Burning, Structural Fires, Forest Fires, Pesticides

No growth was assumed in this category from 1980 to 1987. This category as well as that covering pesticides was held constant for 1987. The methodology used the same as in the 1982 SIP.

2.6 Non-Highway Mobile Sources

Off-Highway Vehicle emissions were calculated using total gasoline use from the Highway Statistics. This report also described the type of vehicle use showing that 23% of the gasoline used by off-highway vehicles was for agricultural purposes and 77% for construction equipment. Lawn and garden equipment, industrial equipment, and off-highway motorcycles each accounted for a negligible percent of the total off-highway gasoline usage for the state, according to this publication.

Emission factors were taken from AP-42 to ascertain the total emissions from off-highway gasoline use.

Off-highway diesel use was determined through the Basic Petroleum Data Book. This was apportioned to three basic categories (Construction, Industrial and Farm) through the EPA Guidelines (EPA 450/2-77-028). Again, emission factors from AP-42 were used to calculate total off-highway emissions from diesel fuel use.

The final figures were apportioned to AQCR regions on a population density basis.

The categories covering Vessels, Aircraft, and Railroads were developed using the methodology established in the 1982 SIP with adjustments made to the population and density statistics. The 1980 U.S. Census and 1987 fuel use figures from the Department of Energy and American Petroleum Institute were used to determine emissions for this area source category.

Tables IV-3 through IV-8 present the 1980 to 1987 Area source emissions inventory by AQCR and area source category. Table IV-9 summarizes all the regions from 1980 to 1987. Table IV-10 and Figure IV-11 further summarize the emissions, SIP projections and differences from 1980 to 1987 by SIP analysis areas.

TABLE IV-3
AREA SOURCE
VOC Emissions for the Berkshire District
(kg/day)

STORAGE, MARKETING AND TRANSPORT. OF GASOLINE	1980	1982	1983	1984	1985	1986	1987
Service Station Load. (I)	638	980	965	943	921	964	1060
Service Stat. Unload. (II)	910	792	980	957	935	979	1076
Underground Breathing	87	81	80	79	77	80	89
Transit Loss	32	27	27	26	25	27	29
SUBTOTAL	1667	1880	2052	2005	1958	2050	2254
NON-INDUST. SURFACE COAT.							
Architectural Coatings	1083	832	948	951	952	956	958
Auto Refinishing	519	344	340	340	341	342	343
SUBTOTAL	1602	1176	1288	1291	1293	1298	1301
SMALL INDUST. SURF. COAT.							
Plastic Products Manuf.	38	26	26	26	27	27	28
Metal Furniture Prod.	0	0	0	0	0	0	0
Misc. Metal Parts Paint.	145	188	187	189	191	194	196
Wood Furniture Prod.	0	0	0	0	0	0	0
Chemical Coating/Prod.	1226	739	745	755	764	774	783
SUBTOTAL	1409	953	958	970	982	995	1007
OTHER SOLVENT USE							
Degreasing	820	543	328	329	330	330	331
Dry Cleaning	347	204	139	139	140	140	140
Graphic Arts	219	145	148	148	149	149	150
Adhesives	0	0	0	0	0	0	0
Cutback Asphalt	343	17	17	18	18	19	19
Consumer/Comm. Solvent	1483	1139	1163	1166	1169	1172	1175
SUBTOTAL	3212	2048	1795	1800	1806	1810	1815
OTHER MISC. SOURCES							
Fuel Combustion	57	56	56	56	56	55	55
Fires: Agric, Struct	39	39	39	39	39	39	39
Pesticide Application	101	101	101	101	101	101	101
SUBTOTAL	197	196	196	196	196	195	195
MOBILE SOURCES							
Off-Highway Vehicles	155	367	378	388	399	410	422
Rail	42	75	44	46	48	50	52
Aircraft	322	369	383	441	450	481	504
Vessels	1435	1368	1417	1415	1388	1375	1361
SUBTOTAL	1954	2179	2222	2290	2285	2316	2339
TOTAL EMISSIONS	10041	8432	8511	8552	8520	8664	8911

TABLE IV-4
AREA SOURCE
VOC Emissions for the Pioneer Valley District
(kg/day)

STORAGE, MARKETING AND TRANSPORT. OF GASOLINE	1980	1982	1983	1984	1985	1986	1987
Service Station Load. (I)	105	98	97	94	92	96	106
Serv. Station Unload. (II)	3624	3168	3120	3047	2977	3117	3427
Underground Breathing	348	326	322	315	308	322	354
Transit Loss	127	108	106	104	101	106	117
SUBTOTAL	4204	3700	3645	3560	3478	3641	4004
NON-INDUST. SURFACE COAT.							
Architectural Coatings	3947	3703	3414	3423	3432	3440	3450
Auto Refinishing	1892	1530	1237	1240	1243	1247	1250
SUBTOTAL	5839	5233	4651	4663	4675	4687	4700
SMALL INDUST. SURF. COAT.							
Plastic Products Manuf.	814	557	589	601	613	512	525
Metal Furniture Prod.	0	0	1	1	1	1	1
Misc. Metal Parts Paint.	1483	1930	1991	2055	2121	2189	2259
Wood Furniture Prod.	135	140	143	146	149	152	155
Chemical Coating/Prod.	0	534	513	492	471	452	433
SUBTOTAL	2432	3161	3237	3295	3355	3306	3373
OTHER SOLVENT USE							
Degreasing	2987	2527	1494	1497	1486	1490	1494
Dry Cleaning	897	44	45	45	45	45	45
Graphic Arts	583	276	279	279	280	281	282
Adhesives	85	87	87	89	90	92	93
Cutback Asphalt	958	95	48	49	50	51	52
Consumer/Comm. Solvent	5405	5026	5190	5204	5217	5231	5244
SUBTOTAL	10915	8055	7143	7163	7168	7190	7210
OTHER MISC. SOURCES							
Fuel Combustion	262	235	240	246	252	257	263
Fires: Agr, Struct	157	157	157	157	157	157	157
Pesticide Application	260	260	260	260	260	260	260
SUBTOTAL	679	652	657	663	669	674	680
MOBILE SOURCES							
Off-Highway Vehicles	599	1625	1674	1657	1641	1624	1608
Rail	103	334	350	365	379	395	410
Aircraft	1263	1447	1505	1730	1765	1888	1979
Vessels	1322	1702	1428	1427	1425	1424	1422
SUBTOTAL	3287	5108	4957	5179	5210	5331	5419
TOTAL EMISSIONS	27356	25909	24290	24523	24555	24829	25386

TABLE IV-5
AREA SOURCE
VOC Emissions for the Central Mass District
(kg/day)

	1980	1982	1983	1984	1985	1986	1987
STORAGE, MARKETING AND TRANSPORT. OF GASOLINE							
Service Station Load. (I)	4043	793	713	697	681	713	784
Service Stat. Unload. (II)	5761	5016	4941	4825	4712	4934	5426
Underground Breathing	554	517	509	497	486	509	559
Transit Loss	201	170	168	165	161	168	185
SUBTOTAL	10559	6496	6331	6184	6040	6324	6954
NON-INDUST. SURFACE COAT.							
Architectural Coatings	3702	3463	3202	3090	2982	2878	2777
Auto Refinishing	1775	1430	1161	1120	1081	1043	1007
SUBTOTAL	5477	4893	4363	4210	4063	3921	3784
SMALL INDUST. SURF. COAT.							
Plastic Products Manuf.	3037	2075	2092	2109	1902	1883	1901
Metal Furniture Prod.	1189	1761	1733	1705	1678	1651	1625
Misc. Metal Parts Paint.	1479	1925	1877	1830	1739	1695	1651
Wood Furniture Prod.	3073	3188	3137	3087	1934	1851	1802
Chemical Coating/Prod.	0	0	0	0	0	0	0
SUBTOTAL	8778	8949	8839	8731	7253	7080	6979
OTHER SOLVENT USE							
Degreasing	2802	1726	1121	1082	925	835	800
Dry Cleaning	1207	916	302	291	281	271	262
Graphic Arts	625	575	588	568	548	529	510
Adhesives	0	0	0	0	0	0	0
Cutback Asphalt	2129	213	106	106	106	106	106
Consumer/Comm. Solvent	5070	4742	4851	4963	5077	5194	5313
SUBTOTAL	11833	8172	6968	7010	6937	6935	6991
OTHER MISC. SOURCES							
Fuel Combustion	213	208	211	213	216	219	222
Fires: Agr, Struct	180	181	181	181	181	181	181
Pesticide Application	176	176	176	176	176	176	176
SUBTOTAL	569	565	568	570	573	576	579
MOBILE SOURCES							
Off-Highway Vehicles	564	1724	1776	1829	1884	1940	1999
Rail	99	222	234	243	253	263	274
Aircraft	289	332	345	396	404	433	453
Vessels	3249	3336	3206	3203	3142	3111	3080
SUBTOTAL	4201	5614	5561	5671	5683	5747	5806
TOTAL EMISSIONS	41417	34689	32630	32376	30549	30583	31093

TABLE IV-6
AREA SOURCE
VOC Emissions for the Metropolitan Boston District
(kg/day)

STORAGE, MARKETING AND TRANSPORT OF GASOLINE	1980	1982	1983	1984	1985	1986	1987
Service Stat. Loading (I)	385	359	351	342	335	350	385
Service Stat. Unload. (II)	13340	11615	11339	11075	10817	11325	12453
Underground Breathing	1283	1198	1169	1142	1115	1168	1284
Transit Loss	465	395	381	373	364	381	419
SUBTOTAL	15473	13567	13240	12932	12631	13224	14541
NON-INDUST. SURFACE COAT.							
Architectural Coatings	18266	16627	16616	16650	16686	16720	16756
Auto Refinishing	8756	6869	6864	6879	6893	6908	6922
SUBTOTAL	27022	23496	23480	23529	23579	23628	23678
SMALL INDUST. SURFACE COAT.							
Plastic Prod. Manuf.	5252	3590	3551	3512	3356	3214	3176
Metal Furniture Prod.	2248	3328	3132	2947	2773	2610	2456
Misc. Metal Parts Paint.	4966	6464	6179	5908	5554	5304	5067
Wood Furniture Prod.	5457	5661	5327	5012	4630	4265	4002
Chemical Coat./Prod.	1307	1357	1327	1298	784	393	366
SUBTOTAL	19230	20400	19516	18677	17097	15786	15067
OTHER SOLVENT USE							
Degreasing	13826	10184	10340	10362	9509	9121	9143
Dry Cleaning	5260	4368	4365	4374	3754	3827	3838
Graphic Arts	3617	2387	2386	2390	2396	2401	2405
Adhesives	909	929	928	948	747	890	911
Cutback Asphalt	1029	103	103	103	103	103	103
Consumer/Comm. Solvent	25016	22774	22758	22806	22854	22902	22950
SUBTOTAL	49657	40745	40880	40983	39363	39244	39350
OTHER MISC. SOURCES							
Fuel Combustion	1387	1245	1264	1283	1302	1321	1341
Fires: Agr, Struct	627	627	627	627	627	627	627
Pesticide Application	101	101	101	101	101	101	101
SUBTOTAL	2115	1973	1992	2011	2030	2049	2069
MOBILE SOURCES							
Off-Highway Vehicles	2264	7346	7255	7182	7111	7039	6969
Rail	160	554	560	583	606	631	655
Aircraft	4164	4769	4926	5665	5779	6183	6478
Vessels	7608	6577	7509	7575	7359	7286	7213
SUBTOTAL	14196	19246	20250	21005	20855	21139	21315
TOTAL EMISSIONS	127693	119427	119358	119137	115555	115070	116020

TABLE IV-7
AREA SOURCE
VOC Emissions for the Southeast District
(kg/day)

STORAGE, MARKETING AND TRANSPORT OF GASOLINE	1980	1982	1983	1984	1985	1986	1987
Service Station Loading (I)	2341	459	442	431	421	441	485
Service Stat. Unload. (II)	3335	2904	2835	2769	2704	2831	3113
Underground Breathing	321	299	292	285	279	292	321
Transit Loss	116	109	106	104	101	106	117
SUBTOTAL	6113	3771	3675	3589	3505	3670	4036
NON-INDUST. SURFACE COAT.							
Architectural Coatings	4820	4824	4882	5008	5137	5269	5404
Auto Refinishing	2310	1991	2015	2066	2119	2174	2230
SUBTOTAL	7130	6815	6897	7074	7256	7443	7634
SMALL INDUST. SURFACE COAT.							
Plastic Prod. Manufacture	847	579	570	562	424	354	346
Metal Furniture Prod.	19	29	29	30	31	32	32
Misc. Metal P. Painting	398	518	518	517	403	389	389
Wood Furniture Prod.	306	317	325	333	341	349	357
Chemical Coat./Prod.	171	178	184	191	64	52	60
SUBTOTAL	1741	1621	1626	1633	1263	1176	1184
OTHER SOLVENT USE							
Degreasing	3648	3018	3064	3143	3159	3222	3307
Dry Cleaning	1451	1437	1455	1492	1490	1371	1411
Graphic Arts	973	840	850	872	894	917	941
Adhesives	55	56	57	59	61	62	64
Cutback Asphalt	1616	162	164	165	168	169	171
Consumer/Comm. Solvent	6601	6607	6686	6858	7034	7215	7400
SUBTOTAL	14344	12120	12276	12589	12806	12956	13294
OTHER MISC. SOURCES							
Fuel Combustion	259	260	267	275	282	290	299
Fires: Agr, Struct	267	267	267	267	267	267	267
Pesticide Application	100	101	101	101	101	101	101
SUBTOTAL	626	628	635	643	650	658	667
MOBILE SOURCES							
Off-Highway Vehicles	806	2068	2042	2022	2001	1981	1962
Rail	66	138	145	151	157	163	170
Aircraft	2030	2324	2402	2763	2818	3015	3159
Vessels	4932	4584	4869	4819	4771	4725	4676
SUBTOTAL	7834	9114	9458	9755	9747	9884	9967
TOTAL EMISSIONS	37788	34069	34567	35283	35227	35787	36782

TABLE IV-8
AREA SOURCE
VOC Emissions for the Merrimack Valley District
(kg/day)

STORAGE, MARKETING AND TRANSPORT. OF GASOLINE	1980	1982	1983	1984	1985	1986	1987
Service Station Load. (I)	2341	459	448	438	427	447	492
Service Stat. Unload (II)	3335	2904	2835	2769	2704	2832	3113
Underground Breathing	321	299	292	285	279	292	321
Transit Loss	116	99	96	94	92	96	106
SUBTOTAL	6113	3761	3671	3586	3502	3667	4032
NON-INDUST. SURFACE COAT.							
Architectural Coatings	3108	3092	3092	3064	3037	3010	2983
Auto Refinishing	1490	1278	1277	1265	1255	1243	1232
SUBTOTAL	4598	4370	4369	4329	4292	4253	4215
SMALL INDUST. SURFACE COAT.							
Plastic Prod. Manuf.	871	595	595	594	564	563	562
Metal Furniture Prod.	0	0	0	0	0	0	0
Misc. Metal P. Painting	244	319	312	305	298	292	285
Wood Furniture Prod.	678	703	705	708	474	470	473
Chemical Coat./Prod.	0	0	0	0	0	0	0
SUBTOTAL	1793	1617	1612	1607	1336	1325	1320
OTHER SOLVENT USE							
Degreasing	2353	1858	1626	1481	1187	936	827
Dry Cleaning	967	730	730	665	606	552	503
Graphic Arts	627	344	344	314	286	260	237
Adhesives	178	181	180	183	186	142	145
Cutback Asphalt	558	56	56	56	56	56	56
Consumer/Comm. Solvent	4257	4236	4235	4235	4235	4235	4235
SUBTOTAL	8940	7405	7171	6934	6556	6181	6003
OTHER MISC. SOURCES							
Fuel Combustion	174	174	176	179	182	184	187
Fires: Agr, Struct	161	161	161	161	161	161	161
Pesticide Application	101	101	101	101	101	101	101
SUBTOTAL	436	436	438	441	444	446	449
MOBILE SOURCES							
Off-Highway Vehicles	562	1379	1362	1361	1336	1322	1309
Rail	38	105	110	115	119	124	129
Aircraft	285	327	338	388	396	455	477
Vessels	1530	1585	1565	1563	1533	1518	1503
SUBTOTAL	2415	3396	3375	3427	3384	3419	3418
TOTAL EMISSIONS	24295	20985	20636	20324	19514	19291	19437

TABLE IV-9

AREA SOURCE
VOC EMISSIONS FOR DISTRICTS
(KG/DAY)

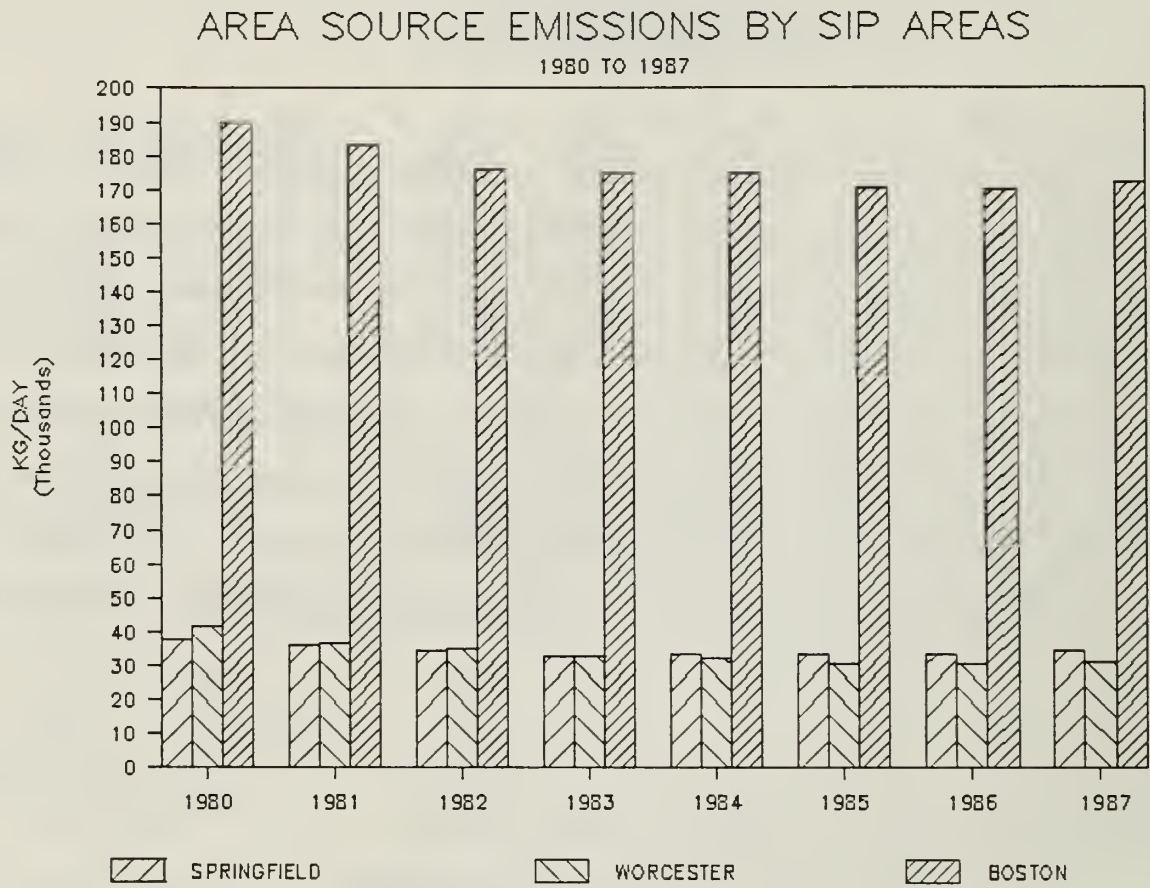
REGION	1980	1981	1982	1983	1984	1985	1986	1987
Worcester	10,041	9,236	8,432	8,511	8,552	8,520	8,664	8,911
Pioneer V.	27,356	26,637	25,909	24,290	24,523	24,555	24,829	25,386
Central Mass	41,417	36,500	34,689	32,630	32,376	30,549	30,583	31,093
Boston	127,693	123,560	119,427	119,358	119,137	115,555	115,070	116,020
Southeast	37,788	35,928	34,069	34,567	35,283	35,227	35,787	36,782
Herrimack	24,295	22,640	20,985	20,636	20,324	19,514	19,291	19,437
TOTAL	268,590	254,501	243,511	239,992	240,195	233,920	234,224	237,629

TABLE IV-10

VOC AREA SOURCE EMISSIONS INVENTORY
BY SIP ANALYSIS AREA (KG/DAY)

SIP AREA	1980	1981	1982	1983	1984	1985	1986	1987
SPRINGFIELD	37,397	35,873	34,341	32,801	33,075	33,075	33,493	34,297
WORCESTER	41,417	36,500	34,689	32,630	32,376	30,549	30,583	31,093
BOSTON	189,776	182,128	174,481	174,561	174,744	170,296	170,148	172,239
ACTUAL EMISSIONS	268,590	254,501	243,511	239,992	240,195	233,920	234,224	237,629
SIP PROJECTED EMISSIONS	268,412	247,334	241,368	237,929	238,182	238,435	238,687	238,939
DIFFERENCE ACTUAL PROJECTED	178	7,167	2,143	2,063	2,013	-4,515	-4,463	-1,310

FIGURE IV-11



V. THE MOBILE SOURCE ELEMENT

The mobile source emissions inventory is compiled in two sections. The first is the total mobile source emissions from motor vehicles calculated by Air Quality Control Region. The second is the reported emission reductions from the implementation of mobile source commitments included in 1982 SIP.

A. Mobile Source Emissions Inventory

The mobile source emissions inventory is an estimate of the quantity of NMOC statewide from highway vehicles. Other mobile source such as off-road vehicles, trains, and vessels are accounted for separately in the area source emissions inventory.

In order to calculate mobile source emissions, two major pieces of information are required: daily vehicle miles travelled in any given year (DVMT) and emission factors (in grams of pollutant per vehicle mile). Although a common technique for estimating DVMT is use of calibrated systems-level transportation models, the DVMT values used in this inventory are based on the statewide traffic counting network and roadway link data maintained and submitted to DAQC by the Massachusetts Department of Public Works (MDPW). The data is categorized by Regional Planning Commissions (Figure V-1) and roadway functional classes (RFC). The inputs used for developing the emissions factors by RPC's and RFC's are shown in Table V-1. The vehicle miles travelled in Massachusetts increased by 18% from 1980 to 1987. Table V-3 shows the calculation of the emissions by multiplying the DVMT by the emission factors.

Emission factors used in this inventory are calculated by Mobile-2, an EPA computer model which was prescribed for use in the 1982 SIP. Mobile-2 accounts for a number of parameters including vehicle ages and types, speeds, ambient temperature, and proportion of travel done by vehicles with warmed-up engines versus cold engines. In April, 1983, Massachusetts implemented an emissions inspection and maintenance program which can also be accounted for in the Mobile-2 emission factor program. Mobile-2 was utilized to generate the 1980 to 1987 SIP projected targets for mobile source emissions. Although Mobile-3 is more up-to-date than Mobile-2, the latter is used in this report in order to be consistent with previous RFP reports and the projected emissions used in the 1982 SIP.

The current mobile source inventory incorporates much of the work performed in the development of the 1982 SIP with the DEQE computerized procedure for calculating emissions: The Mobile Source Emissions Inventory System (MSEI). MSEI consists of a chain of computer programs and associated standard data files, along with

manual procedures performed on files containing specific data for the problem under study. In its present form, MSEI produces reports of total daily emissions by Regional Planning Area (RPA) and Air Quality Control Region (AQCR) statewide by roadway functional class (urban and rural categories). These reports were summarized for NMHC emissions and the SIP projections by regions and SIP analysis areas from 1980 to 1987 as shown in Tables V-4 to V-8 and Figure V-9.

Overall non-methane hydrocarbon emissions are illustrated in Table V-8 and Figure V-9 as decreasing over time despite increases in vehicle miles of travel. The prime reason for this decrease is the turnover in the vehicle fleet; older, less controlled vehicles are replaced with newer vehicles using improved pollution control devices. The inventory decrease is the result of the Federal Motor Vehicle Emissions Control Program (FMVECP) and improved vehicle maintenance because of the statewide Inspection and Maintenance Program.

B. Inspection/Maintenance Program

On April 1, 1983, the I/M program, jointly administered by DEQE and the Registry of Motor Vehicles, was initiated. The program replaced the former semi-annual safety inspection with an annual safety and emissions inspection. The emissions inspection incorporates a tailpipe emissions test of HC and CO as well as a visual check of pollution control equipment and fuel filler-neck restriction for unleaded gasoline.

During the first year (1983) of the program, 17% of the vehicles tested for emissions failed the inspection test and 2% of the failures received waivers after the second failure for a net failure rate of 15%. This failure rate is built into the emission factor file. The years 1984 to 1986 each had net failure rates of 13%. The net failure rate for 1987 was 11.3%.

Appendix C contains the annual I/M report for 1987

C. Transportation Projects Implemented to Reduce Air Pollution

The 1982 SIP explained in detail the process and products undertaken by the Massachusetts Planning Organizations (MPO). Among the products of the 1982 SIP process is each MPO region's Transportation Element of the SIP (TESIP). In the TESIP, the MPO members analyzed a series of reasonably available control measures (RACMS) to control vehicular pollution. Decreased emissions were projected for measures that reduced VMT and idling times and increased travelling speeds. Depending upon the outcome of the analysis, each MPO adopted measures seen to be favorable and necessary for the region. These strategies formed the basis for establishing emission reduction goals by RACM category.

In order to monitor progress toward meeting these reduction goals, it is necessary that both DEQE and the MPOs have the ability to track the RACM's progress through implementation and quantify their impacts on overall RFP. As part of the 1982 SIP, Massachusetts developed a system whereby air quality beneficial projects could be identified in the planning process and tracked through project implementation at which time emission reduction credits can be claimed. Included in this tracking process are highway and transit projects and other RACM strategies. The process is summarized below.

i. Highway Projects

Each year the Massachusetts Department of Public Works' (MDPW) District Engineers inform the MDPWs Bureau of Transportation Planning and Development (BTPD) of all projects undertaken in their region through the MDPW Form 084. The BTPD reviews the "084" forms for projects affecting speed, roadway capacity or VMT, any of which leads to a change in NMOC emissions. The BTPD then forwards the "084" forms for projects with potential air quality impacts to the appropriate Regional Planning Commission (RPC) for preparation of an air quality analysis. Documentation of the calculated change in total emission from projects with identified impacts is forwarded to DEQE. These changes in emissions by RACM are included in the mobile source inventory RFP within the appropriate SIP analysis area. These reductions are summarized in Table V-4.

It should be noted that the level of reductions claimed in a given year depends on the number of projects with air quality impacts that are funded by MDPW and the number of completed projects for which an "084" form has been submitted to the BTPD.

ii. Transit

Regional Transit Authorities (RTA's) are responsible for providing notification to the Executive Office of Transportation and Construction (EOTC) and DEQE of all service and fare changes as they occur. EOTC will inform DEQE of RTA's service and/or fare changes, together with any resulting impacts on ridership or air quality.

iii. Local and Other Projects

The RPCs track and monitor local RACM projects and report progress to DEQE, if any are proposed. DEQE tracks and monitors are projects with the cooperation of EOTC and the RPC's.

TABLE V-1

MOBILE SOURCE EMISSION INVENTORY INPUTS

Parameter	Assumption or Source
1980 thru 1987 VMT	Actual hourly values estimated by (MDPW),
- Boston AQCR	Massachusetts Department of Public Works, adjusted for average summer weekday
- Statewide	Actual daily values estimated by MDPW, adjusted for average summer weekday
Speeds	
- Boston AQCR	Northeast Corridor Regional Modelling Project (NECRMP) measured hourly values by functional class and county
- Statewide	NECRMP measured and other estimated daily values by functional class and regional planning area (Appendix D-1 and D-2)
Vehicle Type Mix	NECRMP measured average by functional class (Appendix D-3 and D-4)
Vehicle Age Distribution by Vehicle Type	LDGV 1987 Massachusetts LDDV Same as LDGV, weighted by EPA projections of national diesel car sales LDGT 1 1987 Massachusetts LDGT 2 National average* LDDT Same as LDGT 1, weighted by EPA projections of national diesel light truck sales HDGV National average* HDDV National average* MC National average* (Appendix D-5)
Vehicle Mileage Accumulation Rates	National average*
Temperature	
- Boston AQCR	Hourly average for region in summer (75°F).
- Statewide	Daily average for substate regions in summer (Appendix D-6)

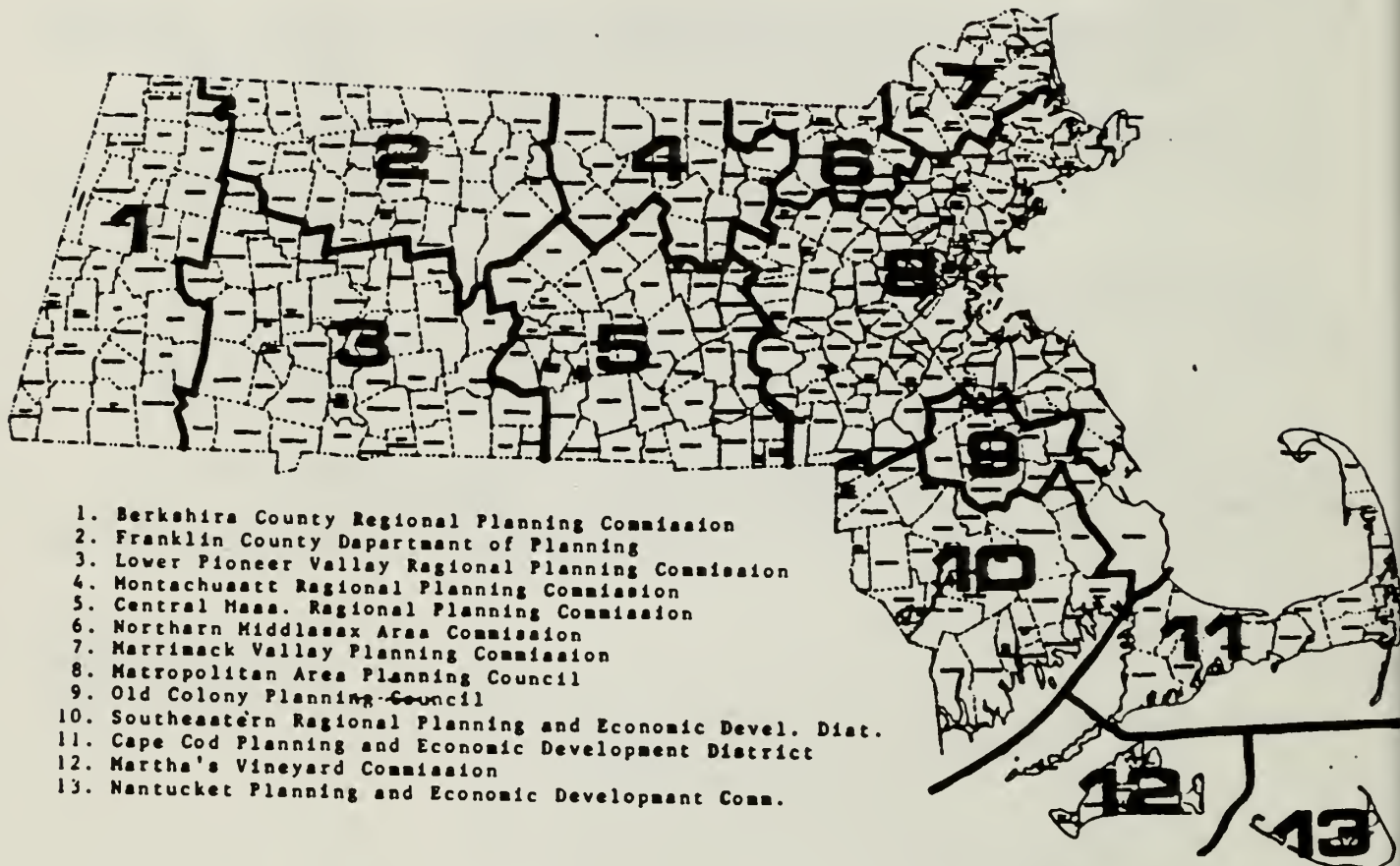
TABLE V.1 (Continued)

Hot/Cold Start Percentages	
- Boston AQCR	Ellis methodology, hourly for region (Appendix D-7)
- Statewide	Ellis methodology, daily by regional planning area. Light duty vehicles - 20.6% non-catalytic cars in cold start, 27.3% of catalytic cars in hot start and 20.6% of the catalytic cars in cold start. (SIP 82 page 102)
Humidity	National average* 75 grains/lb. (difference between Massachusetts average humidity and 75 are insignificant)
Inspection/Maintenance	I/M program results. 11.3% failure rate, no mechanics training. (Appendix C)

*Mobile-2 "default" values

Source: DEQE

FIGURE V-2
REGIONAL PLANNING COMMISSIONS



SOURCE: DEQE

TABLE V-3a

1987 MOBILE SOURCE NMHC EMISSIONS - URBAN FUNCTIONAL CLASS								REGIONAL
=====								TOTAL
RPA		U1	U2	U3	U4	U5	U6	U7
--		----	----	----	----	----	----	----
BERK	VMT87	0	488.4	677	817	2053	1824	1538
	EF	0	0.99	1.01	1.26	1.25	1.37	1.35
	EM	0	4835.16	683.77	1029.42	2566.25	2498.8	2076.3
								13689.78
FRANK	VMT87	756	651	1051	317	995	558	478
	EF	0.96	0.91	1.01	1.26	1.25	1.37	1.35
	EM	725.76	592.41	1061.51	399.42	1243.75	764.46	645.3
								5432.61
L.PICN	VMT87	22445	2173	13458	17671	16389	5416	8904
	EF	0.98	1.05	1.08	1.42	1.59	1.6	1.69
	EM	21996.1	2281.65	14534.64	25092.82	26058.51	8665.6	15047.76
								113677.0
								13279.94
MONT	VMT87	299	6038	3627	1572	3332	1942	1234
	EF	0	0.92	0.94	1.21	1.19	1.31	1.28
	EM	0	5554.96	3409.38	1902.12	3965.08	2544.0	1579.52
								18955.08
CMA	VMT87	24590	10213	14985	5191	10178	2979	5649
	EF	1.04	1.05	1.08	1.42	1.59	1.6	1.69
	EM	25573.6	10723.65	16183.8	7371.22	16183.02	4766.4	9546.81
								90348.5
								10930.35
								128
MID	VMT87	12520	11011	3347	6062	7876	5100	3120
	EF	0.94	0.96	0.98	1.32	1.19	1.31	1.32
	EM	11768.8	10570.56	3280.06	8001.84	9372.44	6681	4118.4
								53793.1
MERR	VMT87	27186	3623	2238	9551	6872	4151	3242
	EF	0.93	0.96	0.98	1.15	1.19	1.17	1.21
	EM	25282.98	3478.08	2193.24	10983.65	8177.68	4856.6	3922.82
								58895.12
								11268.82
MBOS	VMT87	141010	90517	32050	75534	73188	34760	39657
	EF	0.93	0.91	0.95	1.14	1.12	1.23	1.19
	EM	131139.3	82370.47	30447.5	86108.76	81970.56	42754.	47191.83
								501983.2
OCOL	VMT87	0	13297	12484	2326	9783	3704	3271
	EF	0	0.84	0.96	1.05	1.03	1.28	1.25
	EM	0	11169.48	11984.64	2442.3	10076.49	4741.1	4088.75
								44502.78
								54648.6
SEMA	VMT87	24878	15289	9394	5687	12256	7126	6414
	EF	0.91	0.85	0.84	1.18	1.16	1.27	1.25
	EM	22638.98	12995.65	7890.96	6710.66	14216.96	9050.0	8017.5
								81520.73
C COD	VMT87	0	3373	5748	0	4089	3115	2891
	EF	0	0.88	0.86	0	1.16	1.27	1.25
	EM	0	2968.24	4943.28	0	4743.24	3956.0	3613.75
								20224.56
MVIN	VMT87	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0
	EM	0	0	0	0	0	0	0
								0
NANT	VMT87	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0
	EM	0	0	0	0	0	0	0
								0
								S.EAST
						BOST	760919.5	10174.52
								74806.75
TOTAL							STATE	98889.05
								98889.05
vocmcb87								

TABLE V-3b

1987 MOBILE SOURCE EMISSIONS -RURAL FUNCTIONAL CLASS								
=====								
RPA		R1	R2	R3	R4	R5	R6	TOTAL KG/DAY
--		--	--	--	--	--	--	-----
BERK	VMT87	4112	4192	3016	0	2291	789	851
	EF	0.97	0.99	1.01	0	1.04	1.44	1.41
	EM	3988.6	4150.08	3046.16	0	2382.64	1136.16	1199.91
								2959.337
								15903.59
FRANK	VMT87	3878	2721	2515	0	3161	723	1151
	EF	0.97	0.92	1.01	0	1.04	1.44	1.41
	EM	3761.6	2503.32	2540.15	0	3287.44	1041.12	1622.91
								2018.921
								14756.6
L.PION	VMT87	6859	663	7647	0	3913	872	2204
	EF	0.99	0.92	1.03	0	1.07	1.48	1.45
	EM	6790.4	609.96	7876.41	0	4186.91	1290.56	3195.8
								13762.71
								23950.05
								18740.97
								Springfield
								5461.024
								809
MONT	VMT87	2476	4999	4699	0	3412	1330	1032
	EF	0.94	0.88	0.97	0	1	1.37	1.33
	EM	2327.4	4399.12	4558.03	0	3412	1822.1	1075.97
								3654.974
								17594.66
CMA	VMT87	12304	35	9413	0	5032	1595	1032
	EF	0.99	1.02	1.03	0	1.07	1.48	1.45
	EM	12180.	35.7	9695.39	0	5384.24	2360.6	1496.4
								12150.17
								31153.29
								15805.15
								128
								4874.795
								Worcester
MID	VMT87	0	0	311	0	1096	261	205
	EF	0.94	0.95	0.97	0	1	1.37	1.33
	EM	0	0	301.67	0	1096	357.57	272.65
								5582.099
								2027.89
MERR	VMT87	5095	1058	1374	0	1816	285	412
	EF	0.94	0.96	1.03	0	1	1.37	1.33
	EM	4789.3	1015.68	1415.22	0	1816	390.45	547.96
								6886.973
								9974.61
MBOS	VMT87	15552	6785	9825	0	5373	1330	1309
	EF	0.9	0.91	0.97	0	0.94	1.29	1.24
	EM	13996.	6174.35	9530.25	0	5050.62	1715.7	1623.16
								54007.41
								38090.88
OCOL	VMT87	366	5222	1385	0	1326	515	729
	EF	0.91	0.92	0.98	0	0.96	1.31	1.26
	EM	333.06	4804.24	1357.3	0	1272.96	674.65	918.54
								5386.353
								9360.75
SEMA	VMT87	4923	4820	1429	0	7877	1615	1276
	EF	0.92	0.85	0.95	0	0.98	1.34	1.29
	EM	4529.1	4097	1357.55	0	7719.46	2164.1	1646.04
								10303.40
								21513.31
C COD	VMT87	0	7328	10193	0	6906	2262	2485
	EF	0	0.94	0.95	0	0.98	1.34	1.29
	EM	0	6888.32	9683.35	0	6767.88	3031.08	3205.65
								4980.084
								29576.28
MVIN	VMT87	0	0	1075	0	851	481	73
	EF	0	0	0.95	0	0.98	1.34	1.29
	EM	0	0	1021.25	0	833.98	644.54	94.17
								259.394
								2593.94
NANT	VMT87	0	0	0	0	309	80	83
	EF	0	0	0	0	1.13	1.57	1.55
	EM	0	0	0	0	349.17	125.6	128.65
								60.342
								603.42
								87466.05
								11374.10
								1285.2
								217099.2
								86180.35
								120598.9
								Boston
								State
TOTAL		108271	72511.03	105276.5	0	86585.19	28783.2	256365.9
vocmob87								

TABLE V-4

1987 STATEWIDE VMOG REDUCTIONS SUMMARY (KG/DA) INCLUDING ALL RACH'S

METRO. PLANNING ORG.	PROJECT ID(S)	SIP ANALYSIS AREA	VMOG REDUCTIONS KG/DA
BERKSHIRE COUNTY	no projects	SPRINGFIELD	0
PIONEER VALLEY	air qual incomplete	SPRINGFIELD	pending

			SPRINGFIELD AREA TOTAL = 0.0
BOSTON M.P.O.	CARAVAN	BOSTON	58.8
	COMMUTER BOAT PARKING		12.4
	GREEN LINE CAPACITY		69.1
	COMMUTER RAIL CAPACITY		102.3
	RAPID RAIL TRANSIT		74.4
	MISC HWY PROJECTS		89.1
CAPE COD P.E.D.C.	no projects	BOSTON	0
NORTHERN MIDDLESEX	RTE 113	BOSTON	0
MERRIMAC VALLEY	air qual incomplete	BOSTON	pending
OLD COLONY	no projects	BOSTON	0
BOSTON M.P.O.	MISC. HWY PROJECTS	BOSTON	**879.1

			BOSTON AREA TOTAL = 1285.20
CENTRAL MASS	Holden St	WORCESTER	19.1
	Route 9 *		-7.7
	Route 146		64.1
	Route 12		5.5
	Webster Square		6.1
	I190/I290		40.73
MONTAGUSETT	J.FITCH HWY/PEARL ST	WORCESTER	0.204

			WORCESTER AREA TOTAL = 128

KG/DA REDUCTIONS FOR ALL SIP ANALYSIS AREAS = 1413.2

* ROUTE 9 REPRESENTS A KG/DA INCREASE. THE NET DECREASE WAS 128 KG/DA.

** PREVIOUSLY UNREPORTED REDUCTIONS FROM 1983-86

TABLE V-5

	1980 SEASONAL	MOBILE SOURCE ADJUSTED	EMISSIONS (KG/DAY)	
	AQCR	URBAN	RURAL	TOTAL
Pioneer Valley	42	32,797	10,314	43,111
Berkshire	117	4,141	4,343	8,484
Central Mass.	118	27,165	14,544	41,709
Met. Boston	119	144,950	9,436	154,386
Southeast Mass.	120	35,111	21,625	56,736
Merrimack Valley	121	31,636	5,247	36,883
		275,800	65,509	341,309

TABLE V-6

1980 MOBILE SOURCE EMISSIONS BY SIP ANALYSIS AREA

SIP REGION	URBAN	RURAL	TOTAL
SPRINGFIELD	36,938	14,657	51,595
WORCESTER	27,165	14,544	41,709
BOSTON	211,697	36,308	248,005
	275,800	65,509	341,309

TABLE V-7

1987 MOBILE SOURCE NMHC EMISSIONS (kg/dy)

SIP ANALYSIS AREA	ACTUAL URBAN	ACTUAL RURAL	ACTUAL TOTAL	SIP PROJECTED	DIFF. BET. ACTUAL AND PROJECTED
SPRINGFIELD	13280	5461	18741	18918	-177
WORCESTER	10802	4875	15677	15521	156
BOSTON	74807	11374	86181	97020	-10839
TOTAL	98889	21710	120599	131459	-10860

mobur87

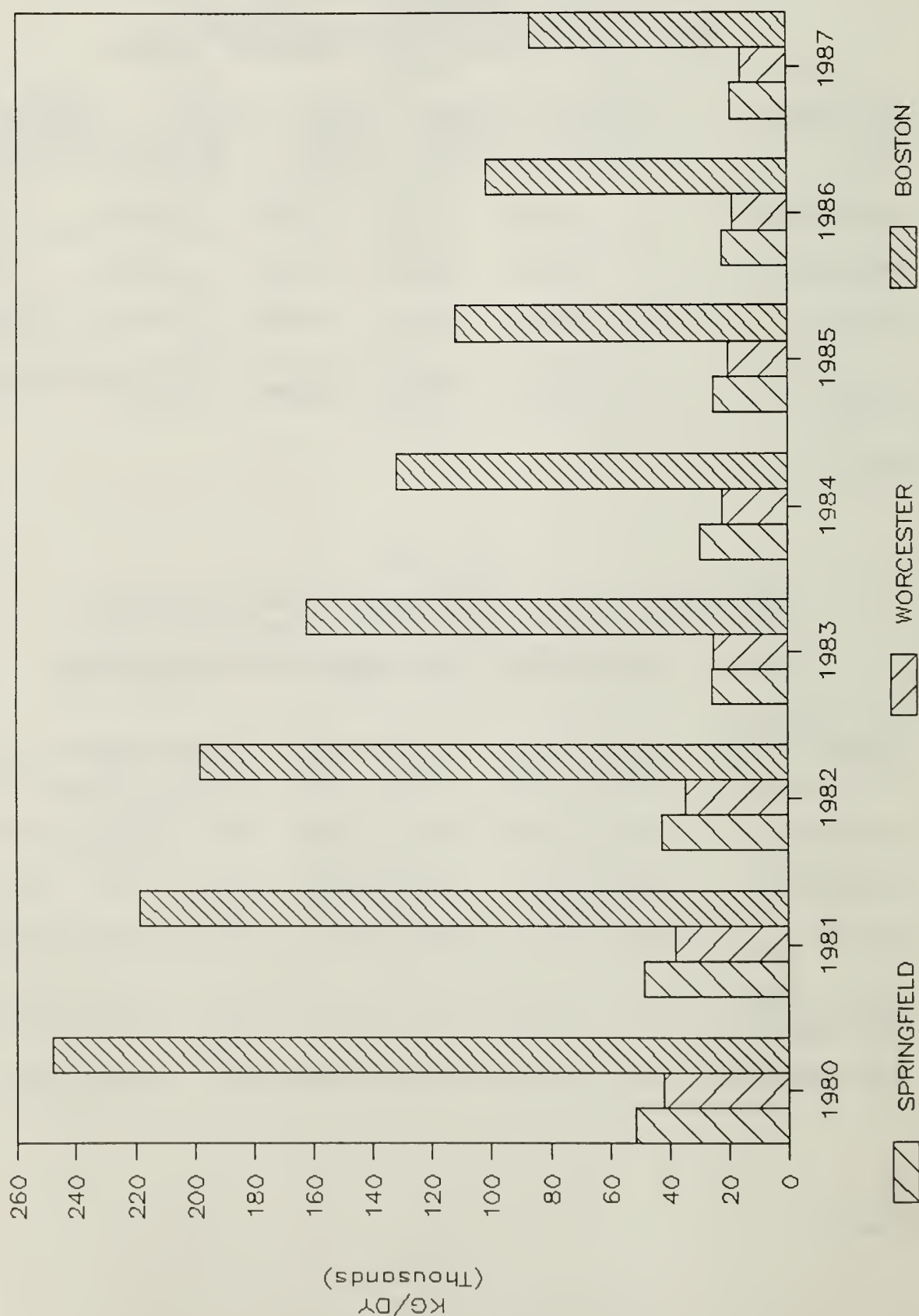
TABLE V-8

1980 - 1987 MOBILE SOURCE NMHC EMISSIONS (kg/dy)

SIP ANALYSIS AREA	1980	1981	1982	1983	1984	1985	1986	1987
SPRINGFIELD	51625	48282	42454	25387	29311	25097	21919	18741
WORCESTER	41709	38074	34395	24783	21920	20154	18273	15677
BOSTON	247973	218278	197889	162007	131783	111908	101266	86181
TOTAL ACTUAL EMISSIONS	341307	304634	274738	212177	183014	157159	141458	120599
SIP PROJECTED	344032	310389	279265	249939	194677	171769	148432	131459

mob87f

FIGURE V-9
MOBILE SOURCE EMISSIONS 1980-1987
BY SIP ANALYSIS AREA



VI. CONCLUSION: DEMONSTRATION OF REASONABLE FURTHER PROGRESS 1987

The stationary point, area and mobile source emission inventories are summarized for the three SIP analysis areas: Springfield, Worcester and Boston. These three SIP areas provide an aggregate statewide emissions total. The emissions for these areas and their rate of reduction from 1980 to 1987 are compared to their respective SIP projected targets.

Table VI-1 summarizes the actual emissions inventory by source category for the SIP analysis areas and for the state for 1980 to 1987. Actual emissions and their associated SIP projected emissions are presented. The 1980 to 1987 reduction rate is calculated, as shown in the last column.

Table VI-2 focuses solely on the 1987 inventory. The differences between the actual emissions and the SIP emission projections are presented in the last column.

Table VI-3 compares the actual reduction rates and the SIP projected reduction rates from 1980 to 1987.

The above tables are illustrated graphically in Figures VI-4 to VI-11. The figures include composite graphs of the three inventory elements showing the actual emissions from 1980 to 1987. Actual emissions are compared with the SIP projected emissions for 1980 to 1987. Figures VI-12 and VI-13 indicate the changing composition of source category contributions to the emissions inventory, and that area sources have replaced the mobile sources as the major component of total emissions over the last seven years.

The following analysis is a summary of the Reasonable Further Progress demonstration from 1980 to 1987 by SIP analysis area for the Commonwealth of Massachusetts.

Springfield SIP Analysis Area

The emissions for this area (64,774 kg/day) were below the SIP projected emissions target by 18,609 kg/day. The emissions from the source categories were below their respective SIP projected emissions except for area sources. The total actual emissions were reduced by 51.3% from 1980 to 1987, and surpassed the SIP projected emissions reduction rate of 37.5%.

Worcester SIP Analysis Area

The actual emissions for this area (57,670 kg/day) were below the SIP projected emissions target by 3,831 kg/day. The mobile source emissions were above the SIP projected emissions. The total actual emissions were reduced by 47.3% from 1980 to 1987, and surpassed the SIP projected emissions reduction rate of 43.8%.

Boston SIP Analysis Area

The actual emissions for this area were (315,830 kg/day), and were below the SIP projected emission target by 8,639 kg/day. The mobile source emissions were below the SIP projected emissions. The total actual emissions were reduced by 41.7% from 1980 to 1987, and surpassed the SIP projected emissions reduction rate of 40.3%.

Statewide

The statewide emissions of 438,274 kg/day were below the SIP projected emissions target of 469,353 kg/day, a difference of 31,079 kg/day or 12,505 tons per year. The 1987 point source emissions were reduced by 54.1% from the 1980 SIP inventory, and the area and mobile source emissions were reduced by 11.5% and 64.7% respectively. Area sources have become the largest component of the inventory and this is due to the significant decline from mobile sources. The actual 1987 emissions for the three source categories, were below their respective SIP projected targets. The combined statewide emissions reduction rate from 1980 to 1987 was 44.1% and surpassed the SIP projected emissions reduction rate of 40.3%.

SUMMARY

This report demonstrates that in 1987 the Commonwealth of Massachusetts made reasonable further progress in controlling Ozone precursor organic compound emissions. Emissions have been significantly reduced as a result of the mobile and stationary source VOC control strategies established in the 1982 SIP. The Massachusetts 1987 VOC emissions were below the SIP projected emission target by 31,079 kg/dy. The 1980 to 1987 actual emission reductions surpassed projected reductions and adequately reflect the control reductions projected in the 1982 SIP. Massachusetts continues to meet the Reasonable Further Progress requirements of Part D of the 1977 Clean Air Act Amendments.

TABLE VI-1

DEMONSTRATION OF REASONABLE FURTHER PROGRESS 1980-1987
BY SIP ANALYSIS AREAS (KG/DAY)

	1980 =====	1981 =====	1982 =====	1983 =====	1984 =====	1985 =====	1986 =====	1987 =====	% REDUCTION 1980-1987 -----
SPRINGFLD =====									
POINT	44044	42355	40973	39869	38348	26937	15401	11736	-73.4%
AREA	37397	35873	34341	32801	33075	33075	33493	34297	-8.3%
MOBILE	51625	48282	42405	25197	29311	25097	21919	18741	-63.7%

ACTUAL EM	133066	126510	117719	97867	100734	85109	70813	64774	-51.3%
PROJ EM	133395	127303	119176	114457	107138	88786	84706	83383	-37.5%
ACT-PROJ	-329	-793	-1457	-16590	-6404	-3677	-13893	-18609	

WORCESTER =====									

POINT	26273	26127	25270	27730	18729	17233	14759	10900	-58.5%
AREA	41417	36500	34689	32630	32376	30549	30583	31093	-24.9%
MOBILE	41709	38074	34346	24783	21920	20154	18273	15677	-62.4%

ACTUAL EM	109399	100701	94305	85143	73025	67936	63615	57670	-47.3%
PROJ EM	109451	100416	94606	90550	84256	66882	64193	61501	-43.8%
ACT-PROJ	-52	285	-301	-5407	-11231	1054	-578	-3831	

BOSTON =====									

POINT	103940	82226	86019	86622	88334	74574	74457	57410	-44.8%
AREA	189776	182128	174481	174561	174744	170296	170148	172239	-9.2%
MOBILE	247973	222663	197352	161995	131783	111908	101266	86181	-65.2%

ACTUAL EM	541689	487017	457852	423178	394861	356778	345871	315830	-41.7%
PROJ EM	543919	503967	471412	446890	405503	353485	337163	324469	-40.3%
ACT-PROJ	-2230	-16950	-13560	-23712	-10642	3293	8708	-8639	

STATE =====									

POINT	174257	150708	152262	154221	145411	118744	104617	80046	-54.1%
AREA	268590	254501	243511	239992	240195	233920	234224	237629	-11.5%
MOBILE	341307	309019	274103	211975	183014	157159	141458	120599	-64.7%

ACTUAL EM	784154	714228	669876	606188	568620	509823	480299	438274	-44.1%
PROJ EM	786765	731686	685194	651897	596897	509153	486062	469353	-40.3%
ACT-PROJ	-2611	-17458	-15318	-45709	-28277	670	-5763	-31079	

rfp87b

TABLE VI-2

1987 RFP DEMONSTRATION - COMPARISON OF ACTUAL
EMISSIONS WITH SIP PROJECTED EMISSIONS (KG/DAY)

SOURCE CATEGORY	ACTUAL EMISSIONS	PROJECTED EMISSIONS	ACTUAL - PROJECTED

SPRINGFIELD			

POINT	11736	30173	-18437
AREA	34297	34292	5
MOBILE	18741	18918	-177
-----	-----	-----	-----
TOTAL	64774	83383	-18609
WORCESTER			

POINT	10900	12867	-1967
AREA	31093	33113	-2020
MOBILE	15677	15521	156
-----	-----	-----	-----
TOTAL	57670	61501	-3831
BOSTON			

POINT	57410	55915	1495
AREA	172239	171534	705
MOBILE	86181	97020	-10839
-----	-----	-----	-----
TOTAL	315830	324469	-8639
STATE			
=====			
POINT	80046	98955	-18909
AREA	237629	238939	-1310
MOBILE	120599	131459	-10860
=====	=====	=====	=====
TOTAL	438274	469353	-31079

targ87

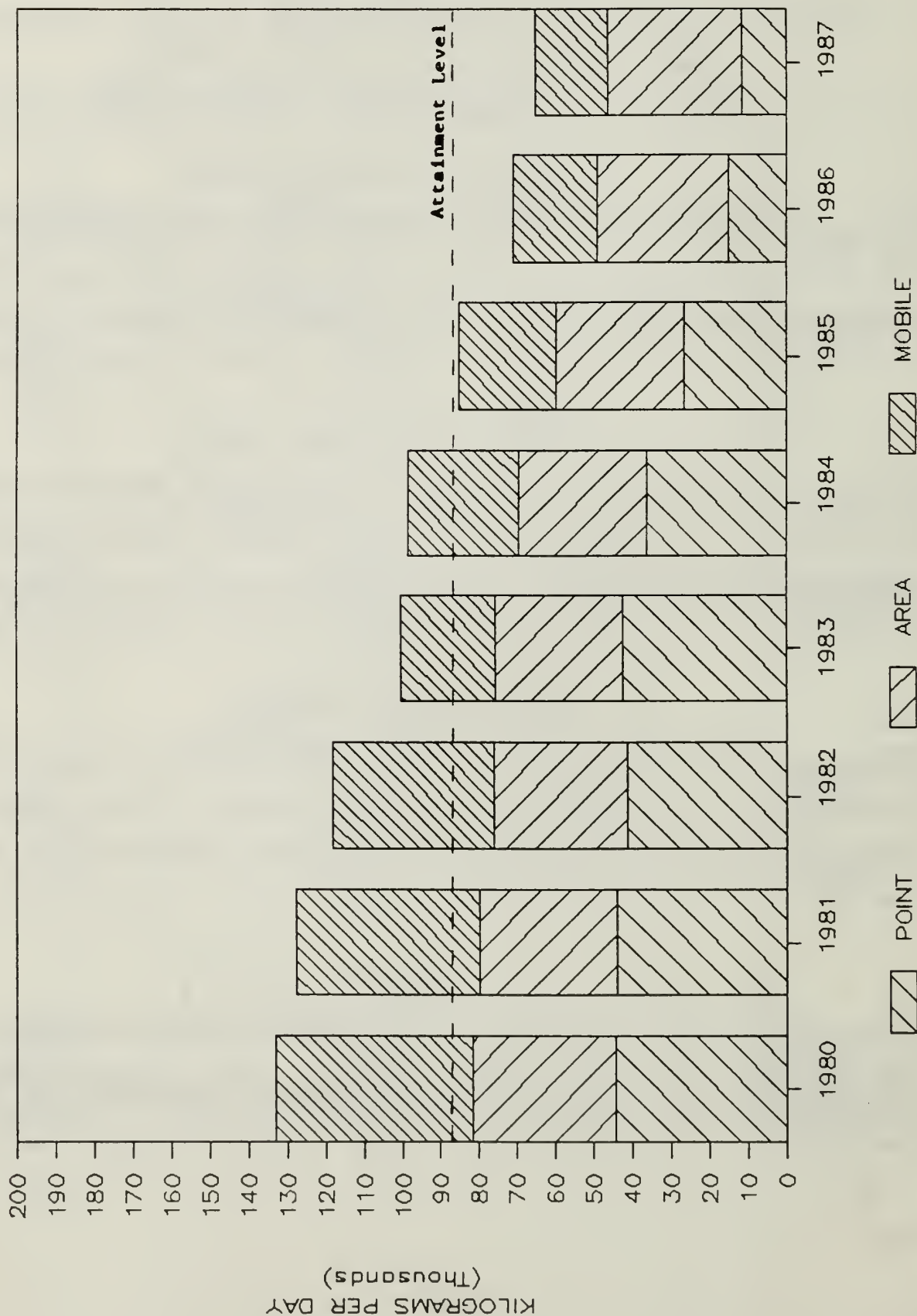
TABLE VI-3

COMPARISON OF ACTUAL EMISSIONS REDUCTIONS WITH SIP PROJECTED
REDUCTIONS - RFP 1980 to 1987 - KG/DAY

	1980	1981	1982	1983	1984	1985	1986	1987
		<u>SPRINGFIELD SIP ANALYSIS AREA</u>						
Projected Emissions	133,395	127,303	119,176	114,457	107,138	88,786	84,706	83,383
Project.% Reduction from 1980		5%	9%	14%	20%	33.4%	36.50%	37.5%
Actual Emissions	133,066	126,510	117,719	97,867	100,734	85,109	70,813	64,774
Actual % Reduction from 1980		5%	12%	26%	24%	36.0%	46.7%	51.3%
		<u>WORCESTER SIP ANALYSIS AREA</u>						
Projected Emissions	109,451	100,416	94,606	90,550	84,256	66,882	64,193	61,501
Project.% Reduction from 1980		8%	14%	17%	23%	38.9%	41.4%	43.8%
Actual Emissions	109,399	100,701	94,305	85,143	73,025	67,936	63,615	57,670
Actual % Reduction from 1980		8%	14%	22%	33%	37.9%	41.9%	47.3%
		<u>BOSTON SIP ANALYSIS AREA</u>						
Projected Emissions	543,919	503,967	471,412	466,890	405,503	353,485	337,163	324,469
Project.% Reduction from 1980		7%	13%	18%	25%	35.0%	38.0%	40.3%
Actual Emissions	541,689	487,017	457,852	423,178	394,861	356,778	345,871	315,830
Actual % Reduction from 1980		10%	15%	22%	27%	34.1%	36.1%	41.7%
		<u>STATEWIDE</u>						
Projected Emissions	786,765	731,786	685,194	651,896	596,897	509,133	486,062	469,353
Project.% Reduction from 1980		7%	13%	17%	24%	35.0%	38.2%	40.3%
Actual Emissions	784,154	714,228	669,876	606,188	568,620	509,823	480,299	438,274
Actual % Reduction from 1980		9%	15%	23%	27%	35.0%	38.7%	44.1%

FIGURE VI-4

SPRINGFIELD SIP RFP 1980-1987



SPRINGFIELD SIP ACTUAL & PROJECTED

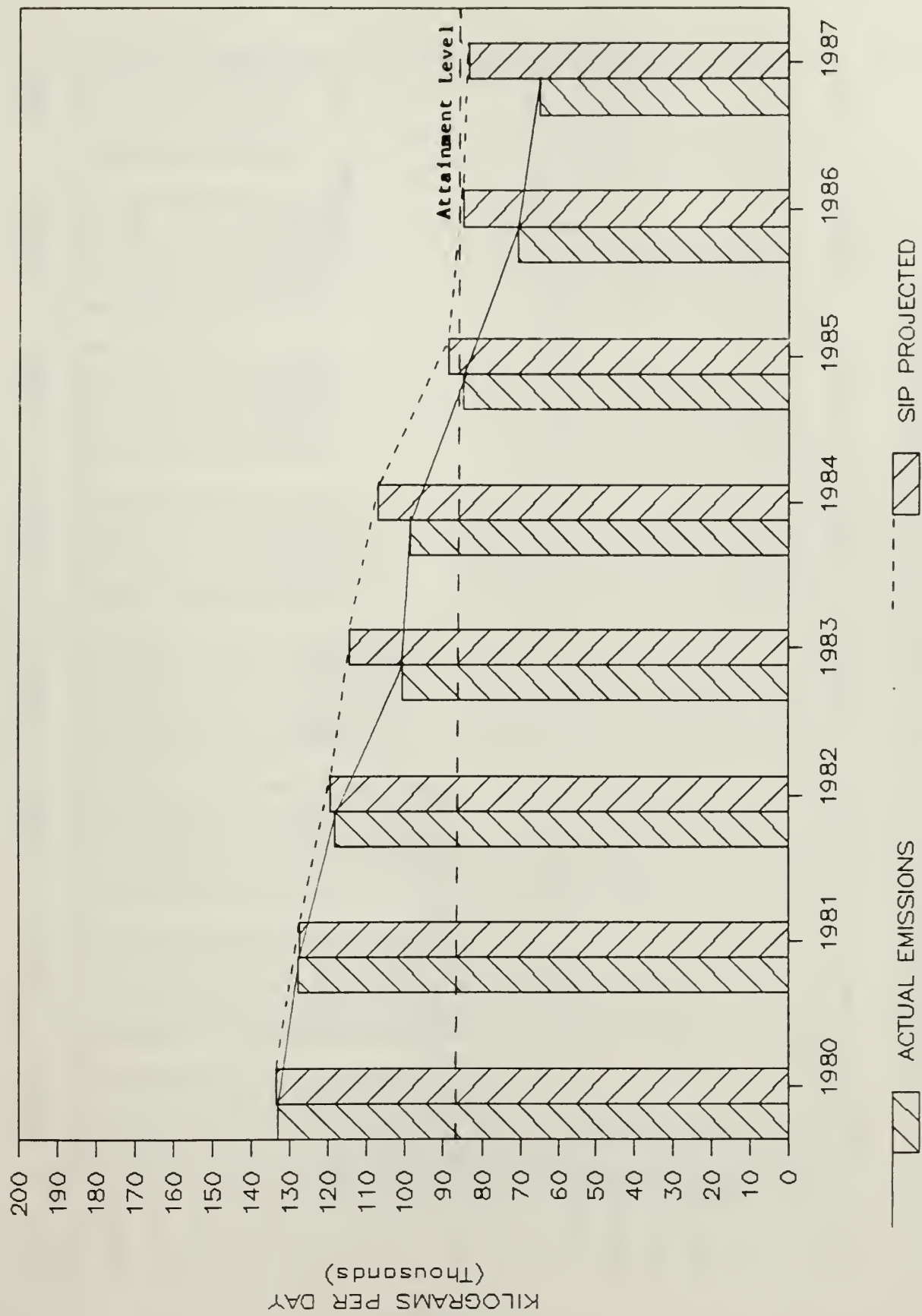


FIGURE VI-6

WORCESTER SIP RFP 1980-1987

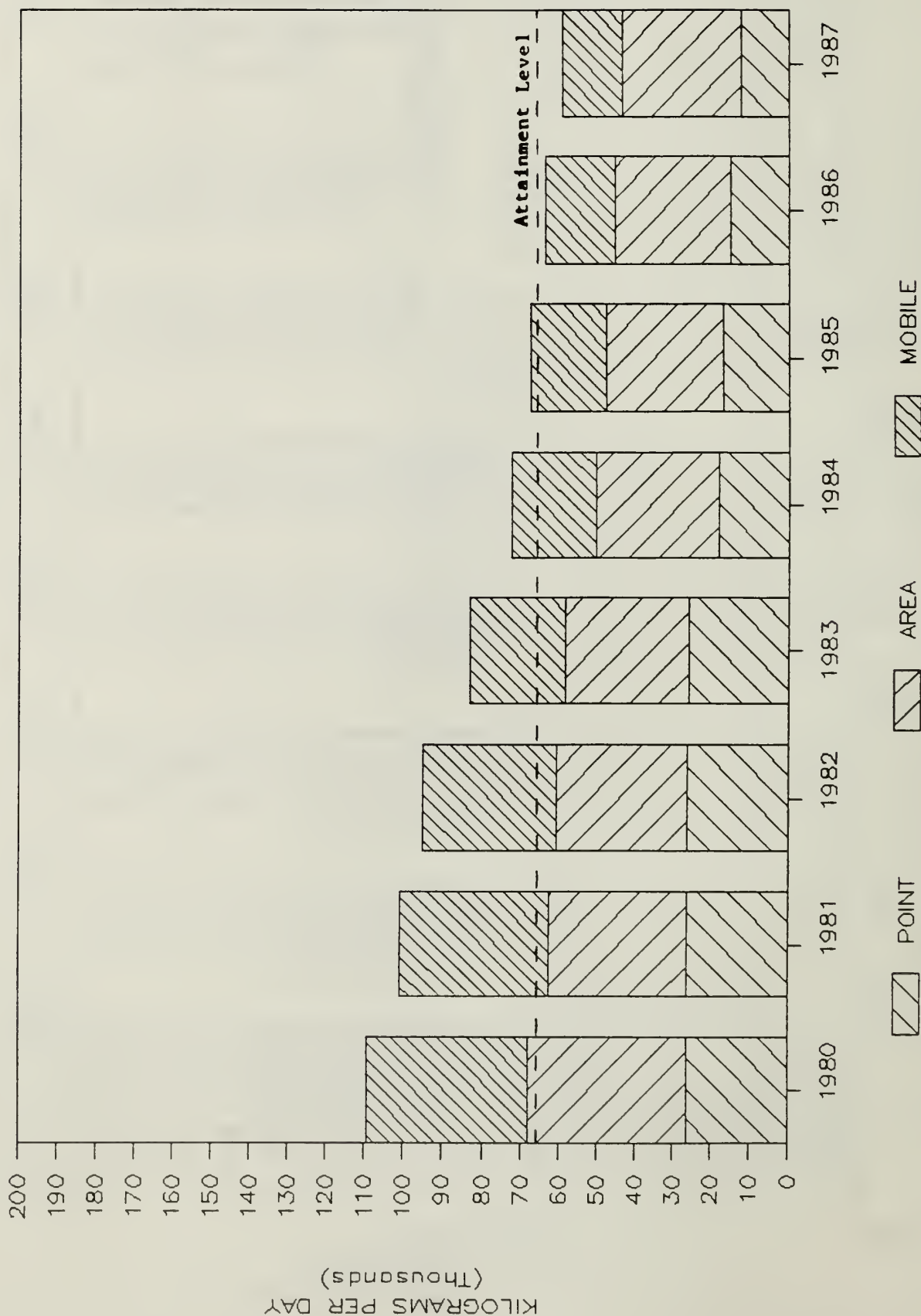


FIGURE VI-7

WORCESTER SIP ACTUAL & PROJECTED 1980 TO 1987

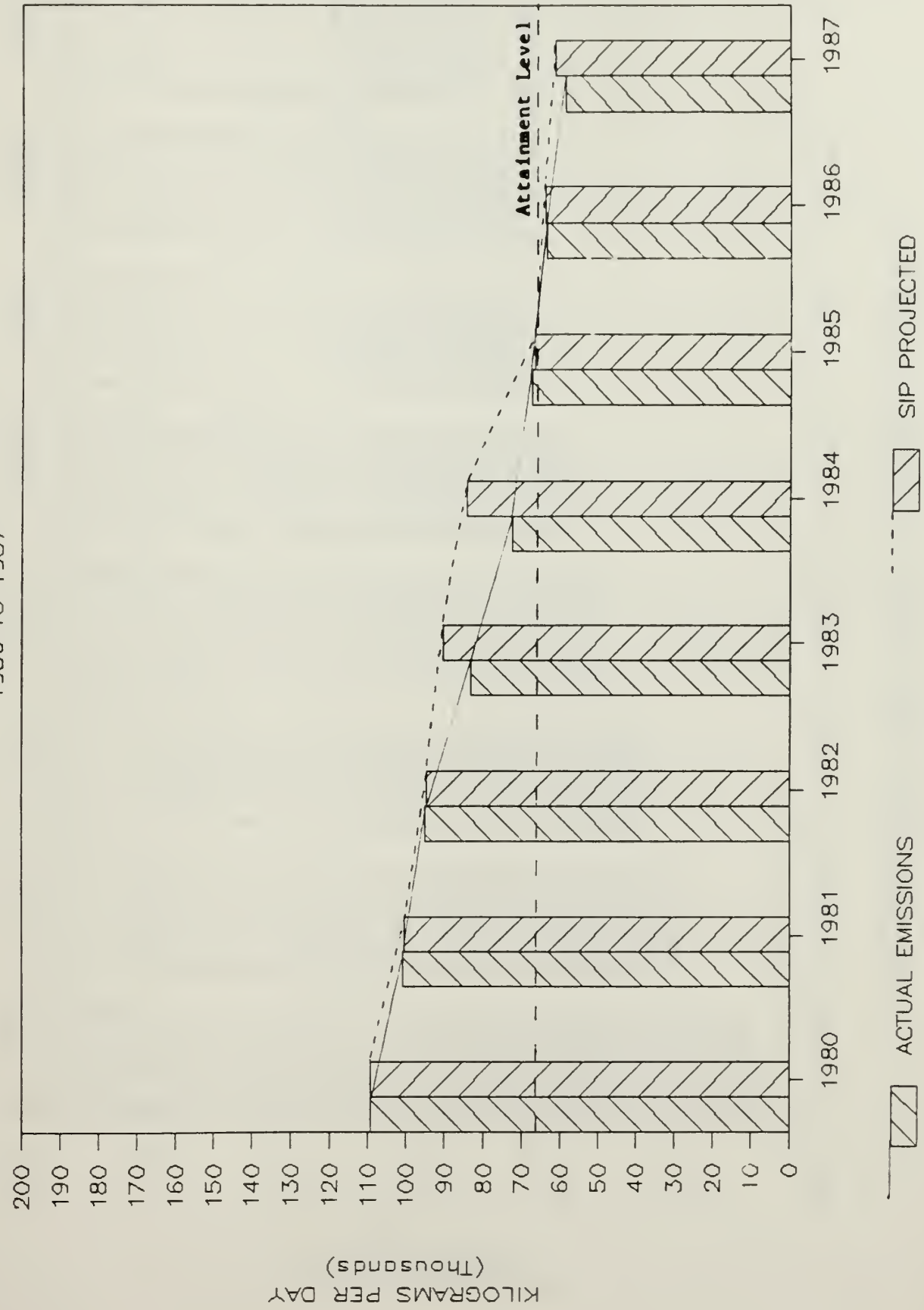


FIGURE VI-8

BOSTON SIP RFP 1980-1987

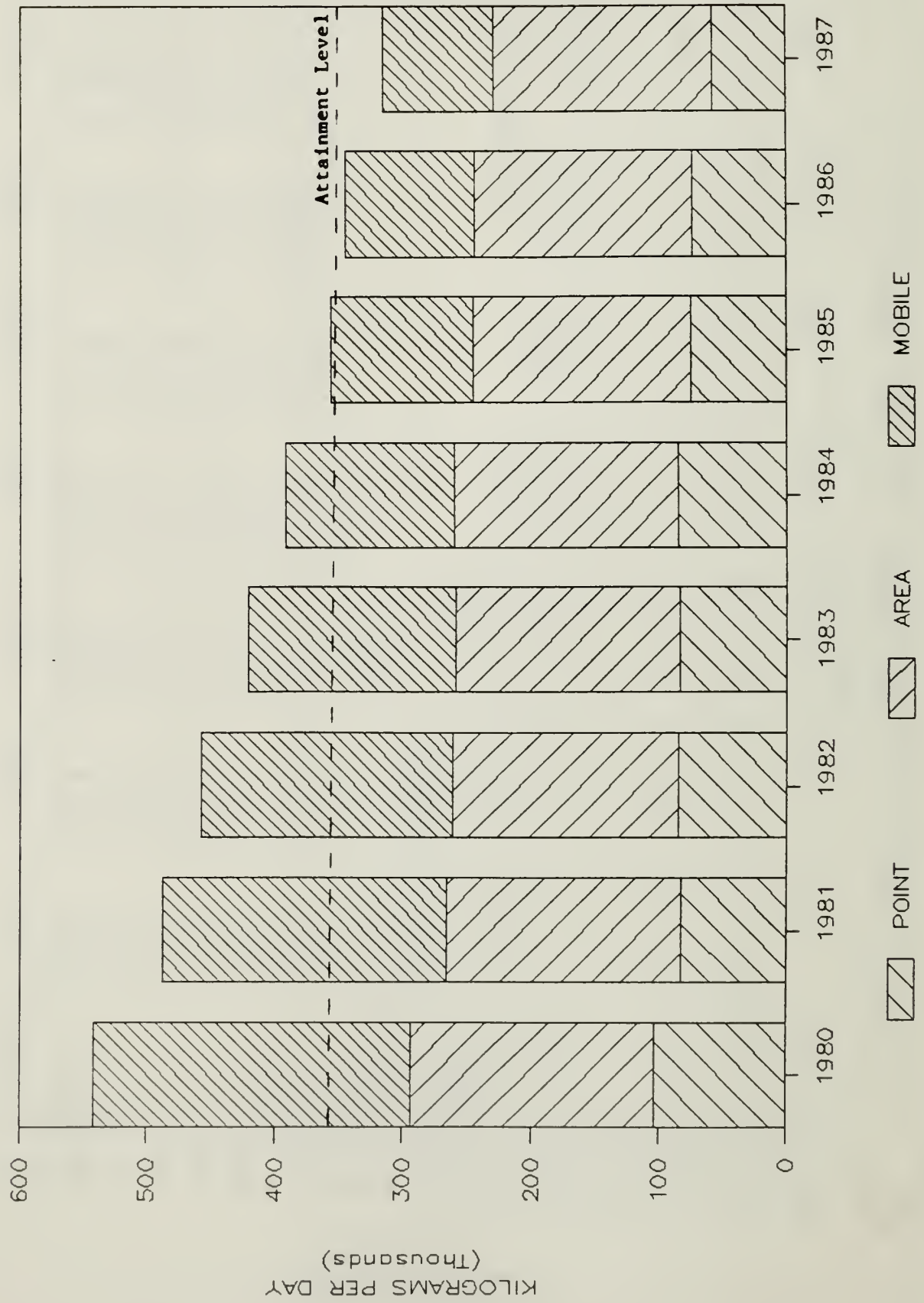


FIGURE VI-9

BOSTON SIP ACTUAL & PROJECTED

1980 TO 1987

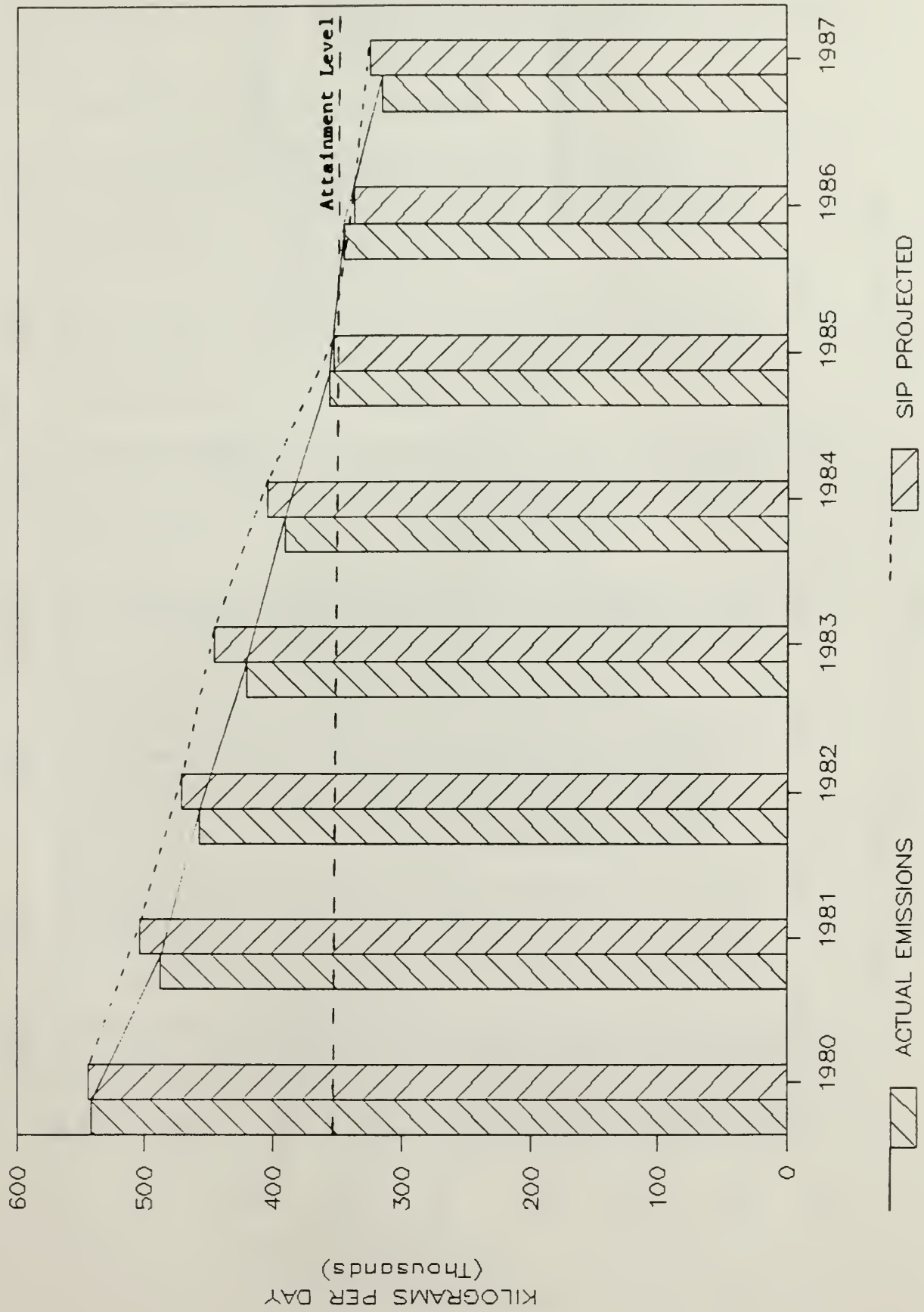
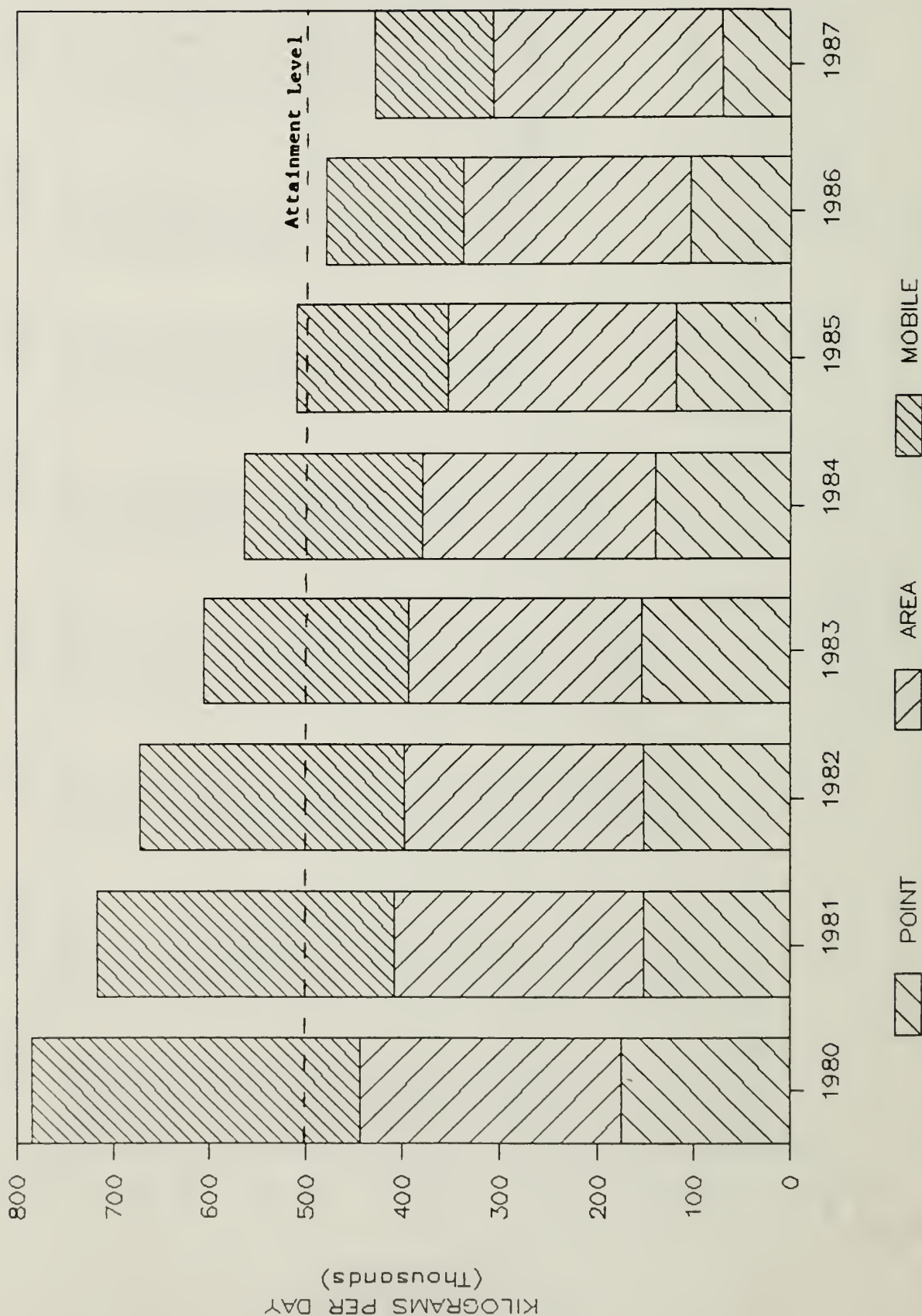


FIGURE VI-10

STATEWIDE RFP 1980-1987



STATEWIDE ACTUAL & PROJECTED 1980-1987

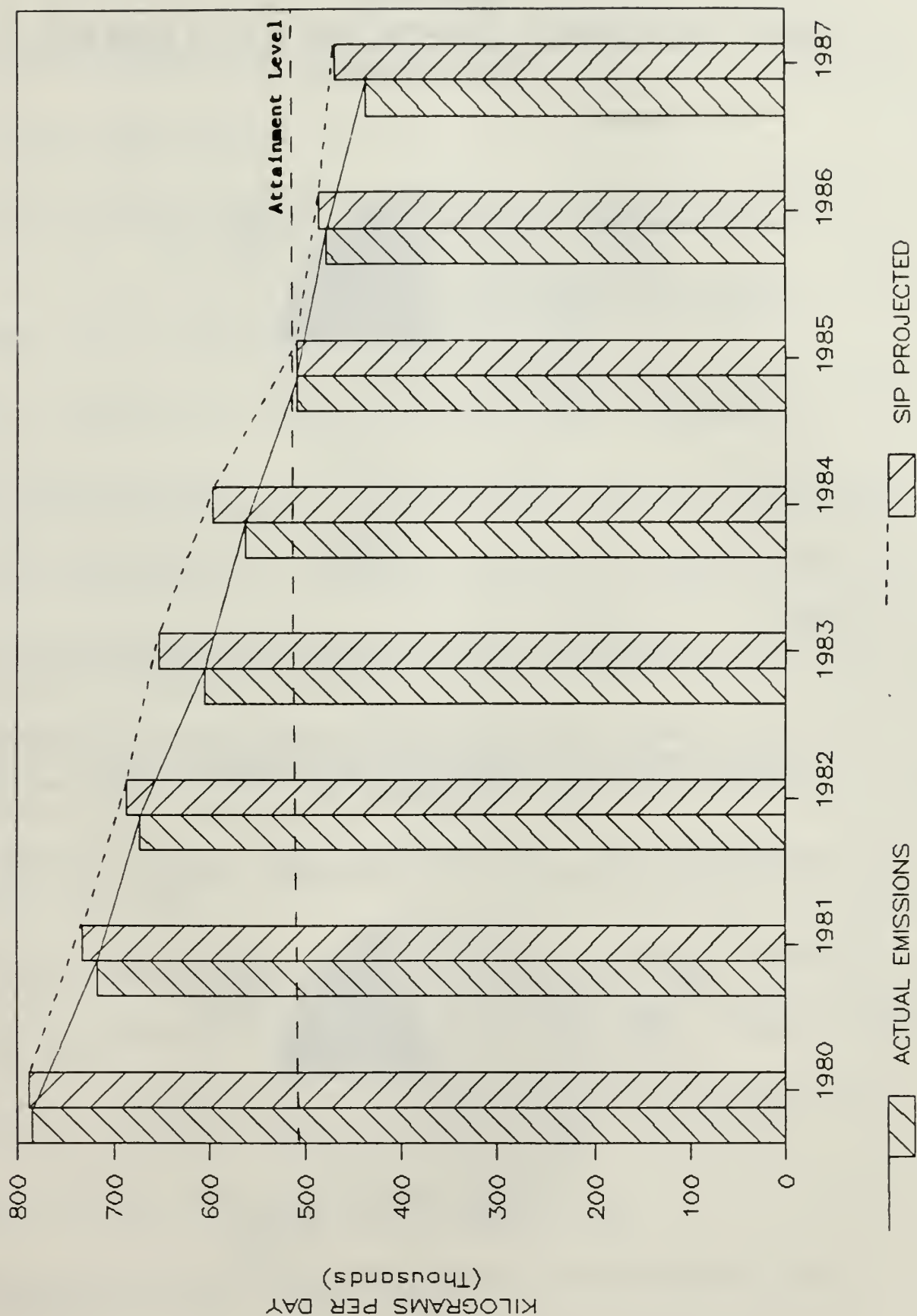
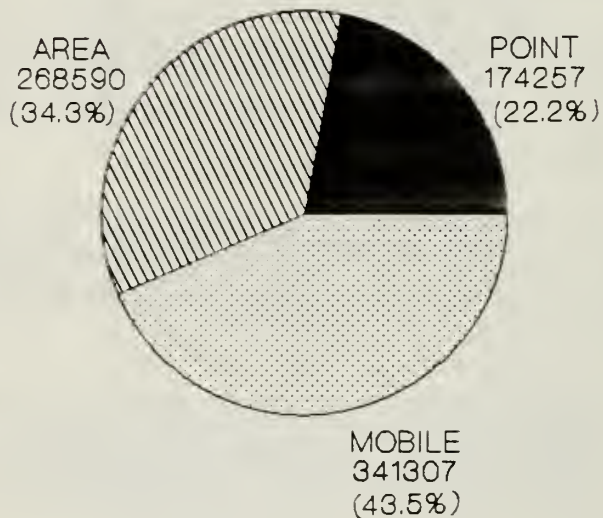


FIGURE VI-12

1980 STATEWIDE EMISSIONS BY SOURCES

784,154 KG/DAY

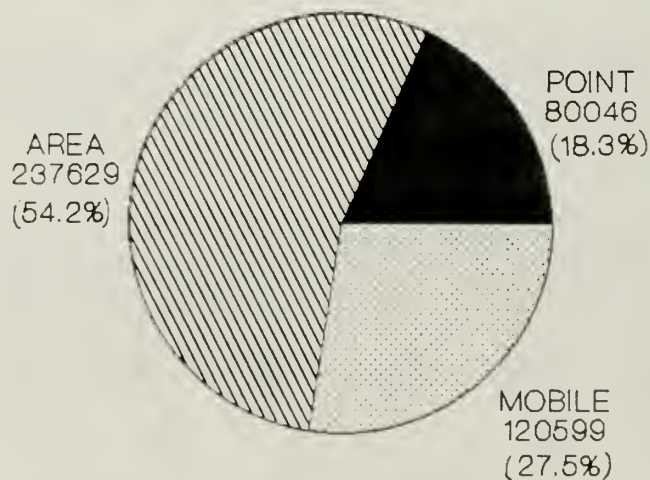


OZRFP80

FIGURE VI-13

1987 STATEWIDE EMISSIONS BY SOURCE TYPE

438,274 KG/DAY



OZRFP87

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APPENDIX A

VOC Point Source Emissions

1980 - 1987

KEY

----- No data available for plant or,
Plant not yet in operation.

C1. Plant Closed.

STATEWIDE MASSACHUSETTS
DEMONSTRATION OF REASONABLE FURTHER PROGRESS
NMOC EMISSIONS IN KG/DAY 1980-87

SOURCE -----	1980 -----	1981 -----	1982 -----	1983 -----	1984 -----	1985 -----	1986 -----	1987 -----
POINT	174257	150708	152262	154221	145411	118744	104617	80046
AREA	268590	254501	243511	239992	240195	233920	234224	237629
MOBILE -----	341307	309019	274103	211975	183014	157159	141458	120599
TOTAL	784154	714228	669876	606188	568620	509823	480299	438274
PROJECTED rfpst87	786765	731686	685194	651897	596897	509153	486062	469353

BOSTON SIP ANALYSIS AREA
 DEMONSTRATION OF REASONABLE FURTHER PROGRESS
 NMOC EMISSIONS KG/DAY 1980 - 1987

SOURCE	1980	1981	1982	1983	1984	1985	1986	1987
-----	-----	-----	-----	-----	-----	-----	-----	-----
POINT	103940	82226	86019	86622	88334	74574	74457	57410
AREA	189776	182128	174481	174561	174744	170296	170148	172239
MOBILE	247973	222663	197352	161995	131783	111908	101266	86181
-----	-----	-----	-----	-----	-----	-----	-----	-----
TOTAL	541689	487017	457852	423178	394861	356778	345871	315830
PROJECTED	543919	503967	471412	446890	405503	353485	337163	324469
rfpbos87								

Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)

Category	# Sources 1987	1981	1982	1983	1984	1985	1986	1987
Misc. Point Sources >100T	28	5091	5223	5211	4675	4712	3982	2975
Paper Coat. Oper.	18	6453	7483	7471	5354	4115	3511	2077
Gas. & Crude Oil	15	4541	4756	5138	4205	3113	3367	3710
Fabric Coat. Oper.	18	8600	7384	7266	6729	3396	3350	2759
Degreasing	22	370	383	384	354	269	230	201
Chemical Manuf.	13	738	736	690	1050	554	840	490
Dry Cleaners	43	528	505	385	508	399	402	425
Misc. Metal Prod.	13	614	521	523	684	625	486	414
Adhesive Manuf.	6	134	140	141	130	77	77	74
Metal Furniture	1	81	83	84	44	57	42	42
Auto Assembly	1	1400	938	926	2437	2012	2172	920
Coating Cans	2	453	484	474	125	268	348	239
Plastic Prod.	2	66	60	60	59	51	51	48
Wood Furniture	2	52	44	42	42	25	40	34
Coat. Metal Coils	1	22	18	18	80	16	15	19
TPY		29143	28758	28813	26476	19689	18913	14427

Misc. Sources Less Than 100 TPY

	SIC							
Food	21	52	59	60	151	7	7	7
Textiles	22	159	714	733	822	1078	1216	772
Apparel	23	136	129	131	131	0	0	0
Lumber	24	62	63	65	168	115	119	95
Furniture	25	78	154	154	296	596	547	361
Paper	26	155	212	209	313	275	310	297
Publishing	27	199	327	326	771	802	1001	823
Chem Prod	28	234	290	288	582	632	566	519

Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year) (Cont.)

Category		1981	1982	1983	1984	1985	1986	1987
<u>Misc. Sources Less Than 100 TPY (Cont.)</u>	<u>SIC</u>							
Petroleum	29	79	78	78	88	56	46	34
Rubber/Plastic	30	188	285	298	285	289	327	293
Leather	31	444	513	510	857	691	680	674
Stone/Glass	32	19	29	29	56	49	58	38
Primary Metals	33	55	57	60	81	135	201	224
Fabricated Metals	34	415	554	550	930	1045	1190	956
Machinery	35	90	148	149	230	231	259	299
Electrical Equipt.	36	840	1129	1146	1512	1220	1354	1049
Transport. Equipt.	37	239	310	370	576	719	643	331
Instrumentation	38	257	367	452	405	985	966	842
Misc. Manufact.	39	240	434	432	811	1391	1555	1058
SUB-TOTAL (TPY)		3941	5852	6040	9065	10316	11045	8672
TOTAL (TPY)		33084	34610	34853	35541	30005	29958	23099
TOTAL (KG/DY)		82226	86019	86622	88334	74574	74457	57410

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

GASOLINE AND CRUDE OIL STORAGE

AQCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
119	281	Amoco Oil Co.	Chelsea	5171	150	129	126	137	109	14	11
	487	Atlantic Rich.	Revere	5171	337	303	296	350	419	419	431
	490	B.P. Oil (Gibbs)	Revere	5171	230	643	628	767	388	546	677
	280	Belcher N. Eng.	Revere	5171	298	177	173	73	99	109	162
	485	Cities Serv.	Braintree	5171	490	505	521	429	530	602	575
	484	Exxon Co.	Everett	5171	470	462	465	339	293	293	325
	486	Exxon Company	Waltham	5171	77	76	76	41	32	75	100
	483	Gulf Oil Co.	Chelsea	5171	206	202	197	446	403	505	551
	481	Mobil Oil Co.	Boston	5171	292	281	274	287	253	338	432
	7708	N. East Petro.	Revere	5171	114	133	130	277	234	230	200
	278	Shell Oil Co.	Waltham	5171	176	194	195	173	189	194	207
	279	Texaco Inc.	Chelsea	5171	178	174	170	C1.	C1.	C1.	C1.
120	871	Harbor F. Oil	Nantucket	4226	131	109	98	98	3	3	2
	903	J. Campbell Oil	Martha's Vineyard	4226	262	235	232	280	5	23	23
	176	Shell Oil Co.	F.River	5171	1130	1133	1558	508	156	16	14
TOTAL					4541	4756	5138	4205	3113	3367	3710

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

FABRIC COATING OPERATIONS

SR	SR#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
	355	Beverly Leath. F.	Salem	3111	7	7	7	7	7	7	7
	223	Haartz-Mason Co.	Watertown	2295	271	198	200	253	176	211	75
	329	Hub Leather Co.	Everett	3069	165	150	149	83	83	59	59
	114	Plymouth Rub. Co.	Canton	3069	1850	1684	1679	1094	1065	970	647
	323	Stedfast Rub. Co.	N. Easton	3069	295	290	286	C1.	C1.	C1.	C1.
	222	The Odell Co.	Watertown	2296	129	123	124	147	88	156	119
	082	Weymouth Art & L.	Braintree	2295	224	199	188	185	194	77	62
	134	Archer Rubber Co.	Milford	3069	635	109	100	420	399	502	474
	140	Coaters Inc.	N. Bedford	2295	617	666	593	72	74	69	21
	305	Fibre Leath. Mfg.	N. Bedford	2645	79	47	35	81	72	67	46
	267	Compo Industries	Mansfield	2295	-	-	-	-	9	9	9
		(Bradford)									
	089	Compo Ind.	Lowell	2295	505	357	358	111	104	32	32
		(Bradford)									
	087	Compo Ind.	Lowell	2295	1908	1803	1810	1715	285	361	412
	146	Huntington Prod.	Lawrence	2261	42	41	41	41	41	41	41
	036	Ideal Tape Co.	Lowell	2641	860	890	875	1587	134	244	202
	050	Majilite Corp.	Lowell	2261	619	421	423	534	390	260	221
	062	Nylco Corp.	Lowell	2645	24	33	32	32	32	32	32
	093	Vernon Plastics	Haverhill	3079	370	366	366	367	367	253	300
		TOTAL			8600	7384	7266	6729	3396	3350	2759

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

DEGREASING

AQCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
119	327	Abcor Corp.	Wilmington	3559	14	14	14	0	0	0	
	205	Bird & Johnson	Walpole	3799	5	5	5	5	5	6	
	1108	Butler Auto. Inc.	Canton	3555	6	6	6	6	6	6	
	1692	Dynamics Res. Co.	Wilmington	3656	2	2	2	2	2	2	
	183	Feely's B. Ename	Quincy	2819	7	7	7	11	11	12	1
	1156	FinCor of N.E.	Waltham	3479	23	23	23	47	28	28	2
	3768	Fraen Corp.	Wakefield	3451	7	7	7	7	7	7	
	1311	Light Metal Plat	Waltham	3471	4	24	25	25	25	25	2
	517	P.C. Phillips	Stoughton	3451	36	36	36	36	1	1	C1
	123	Precision Coat.	Dedham	3479	7	7	7	7	7	6	
	466	Quality Coat.	Woburn	3479	8	8	8	8	8	8	
	214	Standard Thomp.	Waltham	3599	33	32	33	33	19	10	
	441	TRW Carr Div.	Cambridge	3449	73	74	71	16	37	37	3
	078	Westinghouse El.	Hyde Park	3564	24	23	23	11	11	0	
	575	Whitman Plat.	Whitman	3471	8	8	8	8	8	8	C1
120	187	Automatic Mach. Products	Attleboro	3494	24	21	21	21	21	32	3
	146	Morse Cutting T.	N. Bedford	3545	19	15	22	44	45	14	1
	320	Payne Cutl. Corp.	N. Bedford	3420	5	5	5	4	16	16	1
121	232	Amesbury Spec.	Newburyprt	3444	47	46	45	45	C1.	C1.	C1
	029	Honeywell Info. Systems	Lawrence	3573	6	6	6	6	0	0	
	019	Metal Flake Inc.	Haverhill	3497	2	2	2	2	2	2	
	160	Wannalan Cit Tech.	Billerica	3433	10	11	10	10	10	10	
TOTAL					370	383	384	354	269	230	20

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

CHEMICAL MANUFACTURE

R	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
	574	Armstrong Labs	W.Roxbury	2844	42	43	44	44	44	44	44
	121	Samuel Cabot	Chelsea	2851	65	43	40	40	0	0	0
	023	Cadillac Paint	Ashland	2851	6	6	6	11	10	10	10
	1088	Damon Corp.	Needham Heights	2834	68	67	64	64	33	37	37
	5704	General Electric	Chelsea	2851	134	135	140	0	0	0	0
	314	W.R. Grace (Org.)	Acton	2869	122	123	120	569	332	629	288
	5342	Kyanize Paint	Everett	2851	7	22	22	33	33	0	0
	301	K.J. Quinn & Co.	Malden	2800	45	46	45	45	0	0	0
	307	Sterling Clark L.	Malden	2851	218	220	215	216	65	80	71
	185	Attleboro Mfg. (Mantrose-Hauser)	Attleboro	2851	2	2	2	41	6	9	9
	011	General Coatings	Westford	2850	5	5	5	5	5	5	5
	168	General Latex Chem. Co.	Billerica	2850	6	6	6	6	11	11	11
	114	Sagamore Industr. Finishing	Amesbury	2295	19	7	18	15	15	15	15
TOTAL					738	736	690	1050	554	840	490

Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)

DRY CLEANERS

AQCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
119	1180	Antons Cleaners	Braintree	7216	6	6	6	6	6	6	6
	6695	Antons Inc.	Belmont	7210	7	7	7	7	7	7	Cl.
	117	Aveni Cleaners	Holbrook	7216	4	4	4	4	4	18	18
	1121	Bigelow Cleaners	Newton	7210	6	6	6	6	6	6	6
	052	Carlton Cleaners	Boston	7210	4	4	4	4	2	2	Cl.
	195	Central Clean.	Milton	7210	5	5	5	5	5	5	5
	1649	Dependble.Laund.	Quincy	7216	-	-	-	-	07	7	7
	1139	Fashion Care Cl.	Randolph	7210	17	17	17	17	17	17	17
	1786	Franklin Clean.	Boston	7216	-	-	-	-	-	4	4
	1648	Freeport Clean.	Quincy	7216	-	-	-	-	-	4	4
	1142	G&N 1-Hr. Clean.	Newton	7210	12	12	12	12	12	12	12
	376	Holly Cleaners	Newton	7210	3	3	3	3	3	3	3
	165	Lauder-rite									
		Uniform Renta	Wakefield	7210	7	7	7	7	7	7	6
	1569	M&M Cleaners	Boston	7216	-	-	-	-	-	8	8
	1278	Mayfair Cleaners	Dedham	7210	5	5	5	5	5	5	5
	230	N. Randolph Cl.	Randolph	7210	9	9	9	9	9	9	9
	7181	Nu Way Clean.	Medford	7210	7	7	7	7	1	1	1
	163	Orchard Cleaners									
		& Laundry	Newton	7210	7	7	7	7	7	7	7
	1090	Queen Cleaners	Waltham	7210	6	6	6	6	6	6	6
	1115	Radiant Cleaners	Braintree	7216	4	4	4	4	0	0	0
	810	Sans-O-Cleaners	Winchester	7216	7	7	7	7	7	7	7
	200	Sarni Cleaners	Waltham	7210	6	6	6	20	20	20	20
	389	Wallex Clean.	Waltham	7210	16	16	16	16	16	16	16
	378	Waltham Clean.	Waltham	7210	10	10	10	10	10	10	10
	1141	Wayside Clean.	Newton	7210	16	16	16	16	16	16	16
	6703	Whytes Laundry	Lynn	7210	17	16	16	16	0	0	0
	1425	Hollywood Clean.	Watertown	7216	-	-	-	-	-	-	6

Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)

DRY CLEANERS (Cont.)

SR #	FACILITY	LOCATION	SIC	1981	1982	1938	1984	1985	1986	1987
1414	Brookline Valet	Brookline	7212	-	-	-	-	4	4	4
477	Causeway Clean.	Boston	7210	-	-	-	10	10	10	10
1413	Central Clean.	Brookline	7212	-	-	-	9	9	9	9
1260	Centre Cleaners	Walpole	7210	40	40	40	40	40	40	40
1776	Continental Clean	Boston	7216	-	-	-	-	4	4	4
1611	Coverall Service	Boston	7218	-	-	-	33	33	21	7
6652	Craft Cleaners	Lexington	7210	8	8	8	8	8	8	8
1818	L. H. Daluz	Boston	7211	-	-	-	29	29	29	29
1415	Express Clean	Brookline	7212	-	-	-	-	4	4	4
1718	Hans Clean	Boston	7216	-	-	-	-	5	7	7
050	Interstate Unif.	Dorchester	7218	78	78	79	89	89	88	0
1444	Rite-Way Clean	Cambridge	7216	-	-	-	-	8	8	8
3529	Shea Dry Clean.	Cambridge	7210	27	27	27	27	27	27	27
1416	Snow-white Clean	Watertown	7216	-	-	-	-	8	8	8
382	Southside Dye H.	Roxbury	7210	123	123	C1.	C1.	C1.	C1.	C1.
1450	Spotless Clean	Medford	7216	-	-	-	-	4	4	4
1715	Vin's Clean	Boston	7216	-	-	-	55	55	55	1
1454	Congress Clean	Boston	7216	-	-	-	-	5	5	5
1561	Prudential Clean	Boston	7216	-	-	-	-	5	8	8
1790	Shea, Inc.	Somerville	7216	-	-	-	-	5	5	5
300	Coyne Textile	N. Bedford	7218	-	-	-	16	16	18	18
385	General Wk. Cl.	Taunton	7218	48	19	20	13	13	2	2
865	Ideal Laundry	Fall River	7212	3	3	3	0	0	0	0
075	Antons Cleaners	Methuen	7210	7	13	13	0	0	19	0
904	Kleenit, Inc.	Ayer	7216	-	-	-	-	4	5	4
012	Meadowbrook Laun.	N. Andover	7210	13	13	14	14	14	14	14
Total				528	505	385	508	399	402	425

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

MISCELLANEOUS METAL PRODUCTS

AQCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
119	514	Coatings Engin.	Sudbury	3479	59	60	58	66	84	84	76
	1267	Compugraph. Cp.	Wilmington	3555	4	4	4	4	4	4	4
	1268	Compugraph. Cp.	Wilmington	3555	5	6	6	6	6	6	6
	1054	Compugraph. Cp.	Woburn	3555	44	43	44	43	43	43	43
	455	Hewlett Packard	Waltham	3841	67	70	71	71	71	71	48
	213	McCord Winn	Winchester	3469	62	63	61	60	60	0	0
120	219	Alumin. Proc. Cp.	Fall River	3645	98	49	40	40	148	119	110
	125	Foxboro Company	Foxboro	3823	168	118	124	161	49	70	42
	193	Larson Tool & St.	Attleboro	3470	37	20	30	92	33	40	40
	394	Royce Aluminum	Taunton	3645	-	-	-	-	29	29	25
121	281	Spray-O-Matic	Lawrence	3479	31	45	44	98	98	20	20
	042	Wang Labs.	Lowell	3571	19	39	40	40	0	0	0
	076	Wang Labs.	Tewksbury	3600	20	3	3	3	0	0	0
TOTAL					614	521	523	684	625	486	414

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

ADHESIVE MANUFACTURE

QCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
19	305	Emerson & Cumm.	Canton	2819	7	7	7	7	0	0	0
	602	Emmerson & Cumm.	Canton	2819	45	46	46	46	0	0	0
	300	C.L. Hathaway	Lynn	2891	52	52	53	33	33	33	33
	7218	Tape-O-Corp.	Reading	3842	10	11	11	11	11	11	11
	2426	E.T. Wright Co.	Rockland	3131	6	7	7	15	15	15	12
21	067	Flexaust Co.	Amesbury	3496	13	18	18	18	18	18	18
TOTAL					134	140	141	130	77	77	74

METAL FURNITURE PRODUCTION

QCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
21	028	Andrew Wilson	Lawrence	2542	81	83	84	44	57	42	42

AUTOMOBILE ASSEMBLY

QCR	R #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
19	427	GM Assembly	Framing.	3711	1400	938	926	2437	2012	2172	920

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

MISCELLANEOUS METAL PRODUCTS

AQCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	198
119	514	Coatings Engin.	Sudbury	3479	59	60	58	66	84	84	7
	1267	Compugraph. Cp.	Wilmington	3555	4	4	4	4	4	4	
	1268	Compugraph. Cp.	Wilmington	3555	5	6	6	6	6	6	
	1054	Compugraph. Cp.	Woburn	3555	44	43	44	43	43	43	4
	455	Hewlett Packard	Waltham	3841	67	70	71	71	71	71	4
	213	McCord Winn	Winchester	3469	62	63	61	60	60	0	
120	219	Alumin. Proc. Cp.	Fall River	3645	98	49	40	40	148	119	11
	125	Foxboro Company	Foxboro	3823	168	118	124	161	49	70	4
	193	Larson Tool & St.	Attleboro	3470	37	20	30	92	33	40	4
	394	Royce Aluminum	Taunton	3645	-	-	-	-	29	29	2
121	281	Spray-O-Matic	Lawrence	3479	31	45	44	98	98	20	2
	042	Wang Labs.	Lowell	3571	19	39	40	40	0	0	
	076	Wang Labs.	Tewksbury	3600	20	3	3	3	0	0	
TOTAL					614	521	523	684	625	486	41

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

ADHESIVE MANUFACTURE

AQCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
119	305	Emerson & Cumm.	Canton	2819	7	7	7	7	0	0	0
	602	Emmerson & Cumm.	Canton	2819	45	46	46	46	0	0	0
	300	C.L. Hathaway	Lynn	2891	52	52	53	33	33	33	33
	7218	Tape-O-Corp.	Reading	3842	10	11	11	11	11	11	11
	2426	E.T. Wright Co.	Rockland	3131	6	7	7	15	15	15	12
121	067	Flexaust Co.	Amesbury	3496	13	18	18	18	18	18	18
TOTAL					134	140	141	130	77	77	74

METAL FURNITURE PRODUCTION

AQCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
121	028	Andrew Wilson	Lawrence	2542	81	83	84	44	57	42	42

AUTOMOBILE ASSEMBLY

AQCR	R #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
119	427	GM Assembly	Framing.	3711	1400	938	926	2437	2012	2172	920

**Boston Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

SURFACE COATING METAL CANS

AQCR	SR#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
119	822	Sexton Can Co.	Everett	3411	10	10	10	6	6	6	6
121	088	Crown Cork & Seal	Lawrence	3411	443	474	464	119	262	342	233
TOTAL					453	484	474	125	268	348	239

PLASTIC PRODUCTS MANUFACTURE

AQCR	SR#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
119	318	Inco Safety Prod. Granet Div.	Framingham	3079	37	34	33	33	26	26	26
	326	Fort Howard Cup Corp.	Wilmington	3079	28	26	25	25	25	25	25
TOTAL					66	60	60	59	51	51	44

WOOD FURNITURE PRODUCTION

AQCR	SR#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
120	809	Harved Realty	F. River	2527	26	18	16	16	0	15	1
121	072	Country River F.	Amesbury	2511	26	26	26	26	25	25	1
TOTAL					52	44	42	42	25	40	3

SURFACE COATING METAL COILS

AQCR	SR#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
120	155	Teledyne Rodney Metals	N. Bedford	3316	22	18	18	80	16	15	1

**CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS
BOSTON MASSACHUSETTS SIP ANALYSIS AREA**

#	FACILITY		LOCATION	1981	1982	1983	1984	1985	1986	1987
C = 21 :FOOD MANUFACTURING										
1781	BRILLIANT SEAFD.	2092	BOSTON	-	-	-	91	Cl.	Cl.	Cl.
038	JOHNSON MIDDLE.	----	BRIGHTON	52	52	53	53	0	0	0
1005	TYLER INDUSTR.	3069	ANDOVER	-	7	7	7	7	7	7
			TOTAL	52	59	60	151	7	7	7
C = 22 :TEXTILE MILL PRODUCTS										
221	BEMIS ASSOC.	2891	WATERTOWN	5	5	5	5	5	5	0
239	CHELSEA IND.	2290	CHELSEA	-	-	-	31	31	31	31
901	HAARTZ AUTO	2290	ACTON	-	494	516	460	309	205	12
167	LUDLOW CORP.	2611	NEEDHAM	74	74	75	75	75	75	Cl.
1314	MANN INDUST.	2295	FRAMINGHAM	-	-	-	-	-	41	170
496	MIDDLESEX RES.	2294	HUDSON	-	-	-	22	48	48	65
1357	PACESETTER PROD.	2295	SALEM	-	57	54	54	0	0	0
016	ARKWRIGHT FIN.	2262	FALL RIVER	11	11	11	10	3	3	2
039	BERKSH. HATHA.	2221	NEW BEDFORD	4	4	4	4	0	0	0
222	BRISTOL KNIT	2257	F. RIVER	-	-	-	-	4	4	4
290	BRITTANY DYE	6531	B. BEDFORD	-	-	-	-	47	69	68
233	CAPRI TEXTILE	2269	F. RIVER	-	-	-	66	65	66	54
302	DARTMOUTH FIN.	2261	NEW BEDFORD	2	2	2	1	335	339	47
018	DURO FINISHING	2269	FALL RIVER	61	58	57	16	16	131	10
224	DURO TEXTILE	2262	F. RIVER	-	-	-	22	22	17	17
64	HARODITE FIN	2261	TAUNTON	-	-	-	-	8	0	6
229	JOAN FABRICS	2295	FALL RIVER	2	2	2	2	0	0	0
240	MT. HOPE MACH.	2295	TAUNTON	-	-	-	-	-	4	4
118	PIONEER FIN.	2269	F. RIVER	-	-	-	-	14	50	50
342	REED & BARTON	2499	NORTON	-	-	-	27	27	27	43
240	ROSS MATTHEWS	2292	F. RIVER	-	-	-	-	-	4	4
820	SWAN FINISH	2269	F. RIVER	-	-	-	20	20	17	49
139	JAYBIRD & MAIS	2295	LAWRENCE	-	-	-	-	-	38	52
1008	LITTLE RIVER DY.	2269	HAVERHILL	-	7	7	7	7	0	0
1223	STAR TEX IND.	2295	NEWBURYPORT	-	-	-	-	42	42	52
189	BRADFORD IND.	2295	LOWELL	-	-	-	-	-	-	32
			TOTAL	159	714	733	822	1078	1216	772
C = 23 :APPAREL AND OTHER TEXTILE PRODUCTS										
1124	EASTERN UNIFORM	6411	LAWRENCE	71	67	70	70	0	0	0
1149	FRICTION MATER									
	INC.	(0)	LAWRENCE	65	62	61	61	0	0	0
			TOTAL	136	129	131	131	0	0	0
C = 24 :LUMBER AND WOOD PRODUCTS										
2287	E. NORRIS BROWN	2499	E. BRIDGEW.	-	-	-	28	28	24	24
2213	MASCO BLDG. PROD.	2498	BROCKTON	57	58	60	60	12	12	12
358	CHAS.D. BURNS	9999	BOSTON	5	5	5	5	5	5	Cl.
2334	GEM GRAVURE	2893	HANOVER	-	-	-	-	9	9	9
2342	WES-PINE MILLON	2431	HANOVER	-	-	-	-	21	29	24
186	ATTLEBORO WOOD.	2499	ATTLEBORO	-	-	-	31	16	31	18
2493	BAKER BROS.	3471	STOUGHTON	-	-	-	-	5	5	5
851	WALTER A. FURMAN	2431	F. RIVER	-	-	-	19	19	4	3
			TOTAL	62	63	65	168	115	119	95

**CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

<u>SR #</u>	<u>FACILITY</u>	<u>LOCATION</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>19</u>
SIC = 25 : FURNITURE AND FIXTURES									
119/1697	ADCO PUBLISH. 2752	WATERTOWN	-	-	-	-	8	8	
119/1777	F.M. CALLAHAN 3471	MALDEN	-	-	-	-	4	4	1
119/1580	CHADIS PRINT 2751	BOSTON	-	-	-	-	6	6	
119/274	FARINA BROS. 2541	HOLBROOK	4	4	4	4	4	4	
119/1257	J.L. HAMMETT ----	BRAINTREE	74	73	74	74	74	74	Cl
119/1577	MULTI PRINT 2751	BOSTON	-	-	-	-	6	5	
119/1358	NEVLEN CO. 2542	WAKEFIELD	-	10	11	11	11	11	1
119/1581	NOR'EASTERN U. 2751	BOSTON	-	-	-	-	8	8	
119/7599	PARKER BROS. 2751	SALEM	-	-	-	-	90	90	8
119/2219	RALSCO, INC. 2511	BROCKTON	-	-	-	-	10	10	1
119/1479	UNION BOOKBIND 2789	BOSTON	-	-	-	-	5	5	
119/2506	WEHSCO 2514	STOUGHTON	-	-	-	-	46	17	1
119/2526	WOOD-HU KITCH. 2514	W. BRIDGEW.	-	-	-	-	28	36	2
121/120	ADDEN FURN. 2531	LOWELL	-	-	-	65	60	30	2
121/080	BRENTWOOD FURN. 2512	HAVERHILL	-	-	-	23	23	23	
121/184	PLYCRAFT INC. 2511	LAWRENCE	-	67	65	119	118	118	Cl
121/058	R & G MANUF. 2511	AMESBURY	-	-	-	-	95	98	9
121/72	COUNTRY RIV. FURN. 2511	AMESBURY	-	-	-	-	-	-	2
TOTAL			78	154	154	296	596	547	36
SIC = 26 : PAPER & ALLIED PRODUCTS									
119/2121	AVON TAPE 2641	AVON	-	-	-	26	29	26	2
119/765	INTERNT'L. PAPER 2654	FRAMINGHAM	90	95	94	111	63	46	9
119/1525	PEARL PAPER PROD. 2641	BOSTON	-	-	-	26	26	78	4
119/424	L&CP (ST. REGIS) 2649	NEWTON	20	21	21	56	138	99	9
119/2186	SHOE CARTON CORP. 2651	BROCKTON	-	-	-	-	-	5	
119/2436	VENTURE TAPE 2641	ROCKLAND	-	-	-	-	-	25	2
121/916	BEMIS CO. 2891	PEPPERELL	4	4	4	4	3	3	
121/033	PRINCE PACKAG. 2651	LOWELL	41	50	50	50	16	16	
121/001	SHAWSHEEN RUBBER 2295	ANDOVER	-	42	40	40	0	0	
120/870	STONE CONTAIN. CP. 2653	ANDOVER	-	-	-	-	-	-	
TOTAL			155	212	209	313	275	310	29
SIC = 27 : PRINTING AND PUBLISHING									
119/793	ACME PRINTING 3995	MEDFORD	-	-	-	38	38	38	3
119/2491	ALPINE PRESS 2732	STOUGHTON	28	29	27	27	63	63	6
119/721	W.E. ANDREWS CO. 2752	BEDFORD	23	23	23	23	23	23	
119/1136	CLARK FRANKLIN PR. 2751	WESTWOOD	39	40	39	39	98	98	9
119/1343	CRICKET PRESS 2750	MANCHESTER	-	6	6	6	6	6	
119/395	DANIELS PRINTING 2752	EVERETT	-	-	-	47	47	47	4
119/1129	EASTON PROCESS CO. 2751	HINGHAM	42	43	45	45	30	32	3
119/595	GOODWAY GRAPHICS 2752	BURLINGTON	6	6	6	6	6	6	
119/386	GOTHIC HOUSE ----	ASHLAND	9	9	9	9	0	0	Cl
119/871	GRAPHIC ARTS INC. 2752	BOSTON	-	-	-	19	19	19	7
119/1034	KENMORE PRESS 2752	BURLINGTON	5	5	5	5	5	5	
119/635	MIDDLESEX NEWS 2710	FRAMINGHAM	22	22	22	22	22	0	
119/1116	NEW ENG BOOK COMP. 2752	HINGHAM	-	17	17	17	17	17	18
119/1339	PACKARD PAPER BOX 2752	PEABODY	-	35	35	35	35	35	
119/1221	SCREENPRINT INC. 2752	WILMINGTON	4	4	4	4	4	4	
119/1299	ZBR PUBLICATIONS 2752	WILMINGTON	21	21	21	21	21	21	1
121/292	COURIER CORP. 2732	CHELMSFORD	-	30	29	29	29	29	0
121/291	COURIER CORP. 2732	LOWELL	-	37	38	38	38	38	0
121/128	EASTERN PACK. 2642	LAWRENCE	-	-	-	-	-	4	4
121/90	JAMES RIVER 2611	PEPPERELL	-	-	-	-	-	8	0

CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

#	FACILITY	LOCATION	1981	1982	1983	1984	1985	1986	1987
C = 27	:PRINTING & PUBLISHING								
9/2335	ARCATA GRAPHICS	2732 HANOVER	-	-	-	-	-	50	50
9/1588	COLOR GRAPHICS	2751 MALDEN	-	-	-	32	32	32	14
9/6842	COLOUR PICTUR PUB	2752 BOSTON	-	-	-	110	75	75	49
9/1328	COURT SQ. PRESS	2751 BOSTON	-	-	-	-	-	12	12
9/1733	EASTERN PACKAG.	2751 BOSTON	-	-	-	18	18	18	18
9/1828	EASTERN PACKAG.	2751 BOSTON	-	-	-	29	29	29	29
9/1918	LINVURE CO.	2751 SOMERVILLE	-	-	-	-	-	-	76
9/2124	LORELL INC.	2751 AVON	-	-	-	26	26	26	26
9/1576	MERCHANT'S PRESS	2751 BOSTON	-	-	-	14	14	14	14
9/1671	NIMROD PRESS	2732 BOSTON	-	-	-	30	30	30	30
9/6879	SPENCER PRESS	2752 HINGHAM	-	-	-	-	-	-	16
9/1462	UNITED LITHOG.	2752 SOMERVILLE	-	-	-	29	29	29	29
20/848	ELBE PRODUCT CO.	2782 FALL RIVER	-	-	-	-	-	6	6
20/72	RAND MCNALLY	2732 TAUNTON	-	-	-	13	11	10	10
20/157	U.S. RING BINDER	2782 N. BEDFORD	-	-	-	40	37	40	40
	TOTAL		199	327	326	771	802	1001	823

**CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

<u>SR #</u>	<u>FACILITY</u>	<u>LOCATION</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>19</u>
SIC = 28 :CHEMICALS AND ALLIED PRODUCTS									
119/1072	BIRD MACHINE CO.	3569 WALPOLE	34	20	20	10	5	8	
119/1197	BLOX INDUSTRIES	2879 WOBURN	10	10	10	10	0	0	
119/159	BOSTIK DIV. EMHART	2891 MIDDLETON	-	-	-	50	68	18	
119/661	CALIFORNIA PROD.	2851 CAMBRIDGE	-	-	-	68	51	68	
119/1043	CAMGEN CHEMICAL	2851 NORFOLK	4	4	4	4	4	4	
119/925	CHEMPLAST	2821 ACTON	-	7	7	7	7	7	
119/1423	DAMPNEY CO.	2851 EVERETT	-	-	-	-	7	7	
119/1451	DODGE CHEMICAL	2869 CAMBRIDGE	-	-	-	-	80	80	
119/779	EASTERN CHEM. CO.	2851 MALDEN	30	31	30	13	10	13	
119/431	GENERAL CHEMICAL	4953 FRAMINGHAM	6	6	6	6	49	49	
119/1418	HERO COAT.	2891 EVERETT	-	-	-	10	9	10	C
119/1100	INTERPOLYMER CORP.	2850 CANTON	14	14	10	10	30	30	
119/1694	NEW ENG. PRINT	2893 BOSTON	-	-	-	-	4	4	C
119/570	PRINTERS OIL SUP.	2893 WILMINGTON	16	16	16	30	13	30	
119/497	PROCTOR & GAMBLE	2841 QUINCY	10	10	10	10	0	2	
119/5350	SAVOGRAN CO.	2851 NORWOOD	-	-	-	105	10	51	
119/458	SIDMAR ENTERP.	2841 HOLBROOK	6	5	6	6	6	6	
119/308	SURFACE COAT. INC.	2891 WILMINGTON	64	64	63	63	87	0	
119/253	VENTRON DIVISION	2819 DANVERS	4	4	4	4	4	9	
119/1312	WINFIELD BROOKS	2899 WOBURN	-	8	8	8	8	8	
120/803	BEE FIBERGLASS	3079 FALL RIVER	-	-	-	31	33	28	
120/129	FRANKLIN PAINT	2851 FRANKLIN	-	-	-	21	14	16	
120/391	NUBRITE CHEM.	2851 TAUNTON	-	-	-	-	-	-	
120/239	ROMA CHEM. DIV.	2865 F. RIVER	-	-	-	14	10	14	
120/404	SIMEONE CORP.	2951 WRENTHAM	-	-	-	10	31	9	
120/88	TEKNOR APEX	2865 ATTLEBORO	-	-	-	9	21	19	
121/918	ATLAS INDUSTRIES	3079 AYER	-	10	10	3	3	3	
121/026	A.W. CHESTERTON	2842 GROVELAND	36	37	37	37	37	5	
121/193	AVCO CORP TEXTRON	2819 LOWELL	-	-	-	-	-	9	
121/253	BRUSH WELLMAN	2819 NEWBURYPORT	-	8	8	8	8	8	
121/004	B T L SPECIAL RES.	2821 N. ANDOVER	-	-	-	-	-	-	
121/46	HERO COATINGS	2891 NEWBURYPORT	-	-	-	-	-	10	
121/339	KEY POLYMER	2891 LAWRENCE	-	4	4	4	4	4	
121/351	NO. AMERICAN CHEM.	3131 LAWRENCE	-	17	15	15	3	3	
121/054	SERVICE CHEMICAL	2869 N. ANDOVER	-	12	13	13	13	27	
121/248	STREM CHEMICALS	2819 NEWBURYPORT	-	3	3	3	3	3	
TOTAL			234	290	288	582	632	566	5
SIC = 29 :PETROLEUM AND COAL PRODUCTS									
119/282	BROX PAVING	2951 IPSWICH	-	-	-	-	6	6	
119/176	ESSEX BITUMIN.	2951 PEABODY	-	-	-	-	-	4	
119/316	HOT TOP PAVE.	2951 BOSTON	-	-	-	-	-	5	
119/2129	T.L. EDWARDS	2951 AVON	-	-	-	-	4	4	
119/1851	TILCON MASS	2951 WEYMOUTH	-	-	-	-	7	4	
120/259	ALGONQUIN SNG	4925 FALL RIVER	79	78	78	78	19	1	
120/367	SIMEONE CORP	2951 RAYNHAM	-	-	-	-	6	6	
120/2502	SIMEONE CORP.	2951 STOUGHTON	-	-	-	10	10	18	
120/374	SWANSEA ASPHALT	2951 SWANSEA	-	-	-	-	-	4	
120/371	TILCON MA	2951 SANDWICH	-	-	-	-	4	4	
TOTAL			79	78	78	88	56	46	4

**CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

#	FACILITY	LOCATION	1981	1982	1983	1984	1985	1986	1987
C = 30 :RUBBER AND MISC. PLASTIC PRODUCTS									
0/98	ARTHUR BLANK	3079 BOSTON	-	-	-	-	-	-	9
0/653	AMICON CORP. SC.	3079 DANVERS	-	9	9	9	0	0	0
0/083	ARMSTRONG WORLD	3069 BRAINTREE	10	18	28	13	23	19	19
0/042	BELOFRAM CORP.	3823 BURLINGTON	10	10	10	10	10	10	10
0/995	DIGITAL EQUIP.	3079 MAYNARD	-	-	-	-	-	36	36
0/2153	HENRY & FRICK	3079 BRIDGEWATER	-	-	-	-	6	6	6
0/1157	POLYSTRUCTURES	3079 BURLINGTON	34	30	31	31	31	31	31
0/1176	TERKLESON MOLDING	3079 CANTON	29	26	27	27	27	27	27
0/101	ACUSHNET CO. B	NEW BEDFORD	34	30	32	45	43	18	20
0/100	ACUSHNET CO. D	NEW BEDFORD	53	50	49	14	13	14	14
0/351	N.E. PLASTIC COAT.	NORTON	-	-	-	-	-	-	6
0/881	POLYPLY INC.	3079 N. BEDFORD	-	-	-	19	19	19	19
0/387	AMER. EXCELSIOR	3079 CHELMSFORD	-	-	-	12	12	12	12
0/294	COMPO-STYLETEX	LOWELL	-	60	61	61	61	61	61
0/237	OOMPHIES INC.	NEWBURYPORT	-	29	28	21	21	21	C1.
0/064	STYLETEX DIV.	LOWELL	18	17	17	17	17	17	17
0/116	WALBERT PLASTICS	LOWELL	-	6	6	6	6	6	6
TOTAL			188	285	298	285	289	327	293

C = 31 :LEATHER AND LEATHER PRODUCTS

0/1347	ALLEN LEATHER CO.	3111 PEABODY	-	33	35	35	35	35	35
0/2235	BARBOUR CORP.	3111 BROCKTON	-	-	-	-	11	11	11
0/1824	BARNET CORP.	3111 PEABODY	-	-	-	232	177	213	213
0/857	CREESE & CROOKE	3111 DANVERS	86	90	88	88	0	0	0
0/2198	FOOT JOY	3143 BROCKTON	-	-	-	-	19	19	19
0/7711	IDEAL FINISHING	3111 SALEM	92	96	94	94	81	81	81
0/2147	GEO. E. KEITH	3143 BRIDGEWATER	-	-	-	-	4	4	4
0/2214	NORWICK LEATHER	3111 BROCKTON	-	-	-	-	23	10	10
0/686	RICHARD TANNING	3111 SALEM	-	-	-	115	115	53	20
0/237	JOHN J. RILEY CO.	3111 WOBURN	83	87	84	84	86	99	99
0/179	S & S LEATHER CO.	3111 PEABODY	71	73	75	75	0	0	0
0/174	SALM SUEDE	3111 PEABODY	-	-	-	-	-	30	30
0/388	HASKON CORP.	3079 TAUNTON	-	-	-	-	-	9	16
0/906	PMJ, INC.	3079 FRANKLIN	-	-	-	-	-	6	6
0/895	SURREY INDUST.	3079 TAUNTON	-	-	-	-	-	8	8
0/864	TILLY BALLOONS	3065 FALL RIVER	-	-	-	-	-	7	7
1/222	BIXBY INTERNAT.	3131 NEWBURYPORT	50	47	46	46	0	0	0
1/200	CHIC LEATHER	3111 HAVERHILL	42	41	42	42	42	42	42
1/415	CORONET LEATHER	3111 GEORGETOWN	-	11	11	11	11	11	11
1/078	FOSS MANUFACT.	3131 HAVERHILL	8	8	8	8	8	8	8
1/077	FOSS MANUFACT.	3131 HAVERHILL	12	12	12	12	0	0	0
1/349	GRACE SHOE MANUF.	3144 LOWELL	-	10	10	10	10	10	0
1/96	HOYTE WORTHEN	3111 HAVERHILL	-	5	5	5	46	42	42
TOTAL			444	513	510	857	691	680	674

**CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

<u>SR #</u>	<u>FACILITY</u>	<u>LOCATION</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
SIC = 32 : <u>STONE, CLAY AND GLASS PRODUCTS</u>									
119/1244	AMER. ACOUSTICAL	NATICK	17	17	17	20	20	20	
119/005	A.W. CHESTERSON	WOBURN	2	7	7	7	0	0	
121/18	MASS. BITUMIN. PROD.	CHELMSFORD	-	-	-	-	-	7	
119/1301	MICRODYNAMICS	WOBURN	-	5	5	5	5	5	
119/2152	STILES & HART BR.	BRIDGEWATER	-	-	-	24	24	26	
120/856	FOSTER FORBES	MILFORD	-	-	-	-	-	-	
TOTAL			19	29	29	56	49	58	

SIC = 33 : PRIMARY METAL INDUSTRIES

119/1190	HERSEY PRODUCTS	DEDHAM	4	4	5	5	5	0	
119/2310	IBC CORP.	EASTON	-	-	-	-	10	10	
119/905	INDEP. CABLE	HUDSON	-	-	-	-	19	19	
119/1015	INDUSTRIAL HEAT	QUINCY	-	-	-	25	25	42	
119/2191	E.L. LEBARON FND.	BROCKTON	9	10	10	10	27	27	
119/032	LINDBERG HEAT TR.	BOSTON	8	9	9	5	5	5	
119/311	MAGNESIUM CASTING	BOSTON	22	22	22	22	22	47	
119/1705	MATERIALS DEV.	MEDFORD	-	-	-	-	8	8	
119/5167	TRIM ALLOYS INC.	RANDOLPH	12	12	14	14	14	14	
120/083	COOK-HORTON DIV.	N.ATTLEBRO.	-	-	-	-	-	14	
120/074	LEACH & GARNER	ATTLEBORO	-	-	-	-	-	23	
120/73	CHEMER CORP.	ATTLEBORO	-	-	-	-	-	-	
TOTAL			55	57	60	81	135	201	220

SIC = 34 : FABRICATED METAL PRODUCTS

119/1182	ARTISAN IND. INC.	3443	WALTHAM	4	4	4	4	4	4	
119/1340	BACKER LORING CO.	3444	PEABODY	-	21	22	22	22	22	
119/348	BARRY CONTROLS	3499	WATERTOWN	44	45	43	43	43	14	
119/1207	BOSTON TRAILER	3499	WALPOLE	6	6	6	6	6	6	
119/1076	CAMBRIDGE MACH.	3451	SOMERVILLE	-	-	-	26	26	26	
119/1125	COMM. SHEET MET.	3444	CANTON	12	12	12	12	12	12	
119/243	CONTINENTAL CAN	3411	MALDEN	40	41	39	34	34	34	
119/506	DUNCAN GALV.	3479	EVERETT	-	-	-	39	39	39	
119/1338	EAGLE CAN CO.	3411	PEABODY	-	10	10	10	10	10	
119/1154	FIN CP. OF N.E.	3479	WALTHAM	25	26	25	25	13	13	
119/2101	GTR FINISH	3471	ABINGTON	-	-	-	18	18	18	
119/781	HOPWOOD-GLOBE	3471	MALDEN	-	-	-	70	70	35	
119/579	MAS. CORR. INST.	9223	CONCORD	-	-	-	9	8	8	
119/2126	MASS ENGIN.	3443	AVON	-	-	-	18	18	18	
119/347	MODERN ELECT.	3471	BOSTON	59	60	61	61	93	54	
119/453	NRC INCORP.	3499	NEWTON	34	30	31	31	0	0	
119/7586	NUCLEAR METALS	3499	CONCORD	-	-	-	9	2	12	
119/263	H. K. PORTER	3423	SOMERVILLE	-	-	-	10	10	10	
119/1095	RELIABLE ELECTR.	3471	CANTON	92	94	94	61	61	61	
119/330	SCULLY COMPANY	3421	WILMINGTON	5	5	5	5	5	5	
121/1329	WINGAERSHEEK CO.	3432	DANVERS	-	9	9	9	9	9	

**CATEGORIZATION 4F MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

<u>R #</u>	<u>FACILITY</u>		<u>LOCATION</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
E = 34	<u>:FABRICATED METAL PRODUCTS (Cont.)</u>									
D/5717	CAMBR. PLAT.	3471	BELMONT	30	31	31	73	73	73	73
D/1107	DURAELECTRA	3471	NATICK	-	14	13	13	13	13	0
D/1728	FIRST ELECT.	3499	BOSTON	-	-	-	-	7	6	6
D/1609	PETER GRAY	3469	CAMBRIDGE	-	-	-	34	34	34	34
D/1489	HESSE MACH.	3499	BOSTON	-	-	-	-	7	7	7
D/351	RICH. A. KLEIN	2542	NORWOOD	15	13	13	13	13	13	13
D/117	MARSON CORP.	3542	CHELSEA	-	-	-	-	18	18	18
D/231	MCCORD-WINN	3469	WINCHESTER	62	59	56	56	56	56	0
D/1434	META PLASTICS	3499	SOMERVILLE	-	-	-	-	4	4	4
D/2290	MUELLER CORP.	3471	E. BRIDGE-	-	-	-	-	10	10	10
D/2213	MASCO BLDG.	3489	BROCKTON	-	-	-	-	12	12	12
D/2499	QUAL. CRAFT	3429	STOUGHTON	-	-	-	-	13	13	13
D/2549	WHITMAN PLAT.	3471	WHITMAN	-	-	-	-	-	-	8
D/1281	WMF CORP.	3470	WALTHAM	40	40	41	41	41	41	41
D/379	BY. STE. CRUC.	3433	TAUNTON	-	-	-	-	8	8	8
D/267	CARGOCAIRE	3443	AMESBURY	-	-	-	-	13	13	13
D/257	CONGRESS TECH.	3479	DRACUT	-	-	-	-	25	27	27
D/192	FIN CP. OF NE	3479	LOWELL	-	-	-	-	32	49	49
D/302	NYES JAP ENAM.	3479	CHELMSFORD	-	24	25	44	44	44	44
D/139	CHAMBERLAIN NAT.	3483	N. BEDFORD	-	-	-	32	34	67	66
D/007	KILMARTIN IND.	3469	ATTLEBORO	-	-	-	13	13	8	8
D/869	NU-STYLE CO.	3961	FRANKLIN	-	-	-	-	-	-	10
D/152	P.C.I. GP	3421	N. BEDFORD	-	-	-	60	29	60	60
D/20	REFLEK CP.	3469	F. RIVER	-	-	-	-	-	13	13
D/272	SIPPICAN CORP.	3811	MARION	4	4	4	3	17	3	3
D/331	STURDY LANTERN	3499	N.ATTLEBRO.	-	-	-	-	-	19	19
D/091	CADO FABRICAT.	3400	AMESBURY	-	6	6	6	6	6	0
D/912	ECKEL IND.	3442	AYER	-	-	-	20	20	20	20
D/323	POLY-STRUCTURES	3479	AMESBURY	-	-	-	-	-	15	15
D/61	ROCHE BROTHERS	3411	LOWELL	-	-	-	-	-	31	31
TOTAL				415	554	550	930	1045	1190	956

**CATEGORIZATION 4F MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

<u>SR #</u>	<u>FACILITY</u>		<u>LOCATION</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
SIC = 35	<u>:MACHINERY</u>									
119/425	B.C. AMIS	3545	WALTHAM	4	4	4	4	4	4	
119/2174	ASTRO-GEAR	3541	BROCKTON	-	-	-	-	6	6	
119/1152	COMPUTERVIS.	3573	BEDFORD	7	7	7	7	7	7	
119/815	CTI CRYOGEN.	3580	WALTHAM	18	32	33	33	33	33	
119/2546	INCO, INC.	3545	WHITMAN	-	-	-	-	8	6	
119/1274	INTERN. SHOE	3559	BEDFORD	6	6	6	6	6	6	
119/692	IONICS, INC.	3559	WATERTOWN	-	-	-	97	97	92	
119/019	KINNEY VACUUM	3561	CANTON	5	5	5	5	5	5	
119/1812	LISTA INTERN.	3449	HOLLISTON	-	-	-	-	-	12	
119/626	MARKET FORGE	3589	EVERETT	23	23	24	24	7	7	
119/2125	MASONELIAN DV.	3560	NORWOOD	5	5	5	5	0	0	
119/2266	PRODUCTION ENAM.	3479	BROCKTON	-	-	-	-	-	9	
119/7588	W.H. NICHOLS	3549	WALTHAM	6	6	6	6	6	6	
119/1376	SUPATCO	3111	PEABODY	-	17	17	17	17	17	
119/029	SUPERIOR PROCESS	3479	FRAMINGHAM	-	-	-	-	-	20	
119/148	SUPERIOR PROCESS	3471	FRAMINGHAM	-	-	-	-	-	29	
119/003	USM MACH. DIV.	3559	BEVERLY	16	15	15	15	15	2	
119/711	WOBURN ST. DRUM	3479	WABURN	-	-	-	-	-	27	
120/826	INTERNAT'L DRYER	3589	N. BEDFORD	-	-	-	-	-	-	
120/957	CONSOLIDATED COAT	3573	BELLINGHAM	-	-	-	-	-	-	
121/004	BTL SPECIAL RES.	3545	ANDOVER	-	22	21	5	5	29	
121/319	WANG LABS	3573	LOWELL	-	6	6	6	6	6	
<u>TOTAL</u>				90	148	149	230	231	259	297

SIC = 36 :ELECTRICAL EQUIPMENT

119/196	FENWAL INCO.	3629	ASHLAND	-	-	-	-	-	22	
120/372	AMER. LIGHT	3646	TAUNTON	-	-	-	-	-	-	
120/802	ASHWORTH BR.	3552	F. RIVER	-	-	-	-	-	28	
120/911	NORWELL MFG.	3641	TAUNTON	-	-	-	-	-	12	
120/99	SARAMA LT.	3648	F. RIVER	-	-	-	-	-	5	
120/2	TEXAS INST.	3622	ATTLEBORO	-	-	-	-	-	-	
120/914	NORWELL MFG.	3641	TAUNTON	-	-	-	-	-	10	
121/218	GOULD CORP	3079	NEWBURY	21	27	27	27	27	27	
121/219	GOULD CORP	3613	NEWBURYPORT	6	12	15	15	0	0	
121/229	ELECT. PR.	3674	NEWBURYPORT	4	6	6	6	-	6	
121/263	MAGNOMET.	3662	METHUEN	1	1	1	1	1	1	

CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

#	FACILITY	LOCATION	1981	1982	1983	1984	1985	1986	1987
C = 36 ont.)	<u>: ELECTRICAL EQUIPMENT</u>								
9/1282	ALTRON, INC.	WILMINGTON	-	16	16	16	16	16	16
9/7663	ANDERSON POW.	BRIGHTON	31	30	31	31	31	7	7
9/2492	GTE GOV'T CP. (0)	STOUGHTON	17	17	18	18	18	18	0
9/770	ARMATRON INT.	MELROSE	-	10	10	10	10	10	0
9/830	CHLORIDE PYRO.	HINGHAM	17	17	17	17	17	17	17
9/1103	EG&G TORQUE	WATERTOWN	10	10	10	10	10	10	1
9/456	EXIDE ELECT.	RANDOLPH	11	11	11	11	11	11	0
9/634	FENWAL ELECT.	FRAMINGHAM	22	22	22	22	22	22	22
9/2288	FOXBORO COMP.	BRIDGEWATER	22	23	23	23	3	3	1
9/684	GTE PRODUCTS	DANVERS	36	73	74	74	90	71	87
9/452	GTE PRODUCTS	NEEDHAM	32	31	32	47	56	38	36
9/457	GTE SYLVANIA	SALEM	33	32	33	33	0	0	0
9/576	MICROWAVE ASSOC.	BURLINGTON	35	34	33	33	33	33	0
9/1205	MICROWAVE DEV.	NEEDHAM	6	6	6	6	6	6	6
9/338	NAP COMMERCIAL	WALTHAM	4	4	4	4	4	4	0
9/1002	N.E. INSTITUTE	NATICK	5	5	5	5	5	5	5
9/375	NORFOLK CONVEYOR	COHASSET	41	41	41	29	29	29	23
9/798	OMNI-WAVE ELECTR.	GLOUCESTER	-	14	14	14	14	14	0
9/1199	PICKER INTERNAT.	BEDFORD	11	11	11	11	11	11	11
9/001	RAYTHEON COMP.	WALTHAM	52	51	51	51	0	0	0
9/1065	RAYTHEON CORP.	WALTHAM	16	16	16	16	16	16	0
9/7286	R.C.A. AUTOMAT.	BURLINGTON	8	8	8	8	0	0	0
9/561	SEMICON, INC.	BURLINGTON	35	32	33	29	29	29	5
9/609	TELEDYNE PHILB.	DEDHAM	4	4	4	4	4	4	4
9/519	UNITRODE CORP.	SALEM	75	74	75	55	55	55	55
9/7299	UNITRODE CORP.	WATERTOWN	93	92	92	92	55	55	55
0/156	HANDY & HARMON	ATTLEBORO	21	28	34	34	1	0	0
0/087	SWANK, INC.	ATTLEBORO	44	45	44	91	48	41	41
1/117	CONSOLIDATED DES.	LOWELL	-	10	10	10	10	10	0
1/364	CRAIG SYSTEMS CP.	LAWRENCE	-	44	45	45	39	39	39
1/229	ELECTRONIC PROD.	NEWBURYPORT	-	6	6	6	6	6	0
1/035	GENERAL ELECTR.	LOWELL	55	35	36	36	7	15	15
1/187	ITT SEMICONDUCT.	LAWRENCE	-	15	15	15	15	15	0
1/320	KEENE ADVNCD. ABS.	AMESBURY	-	7	7	7	7	7	0
1/013	MERRIMACK MAGNET.	LOWELL	15	25	25	25	25	25	25
1/167	MICROFAB	AMESBURY	70	84	85	111	124	124	Cl.
1/108	MODICON	ANDOVER	28	7	7	7	7	7	0
1/171	SILICON TRANSIST.	CHELMSFORD	-	13	13	13	13	13	0

**CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

<u>SR #</u>	<u>FACILITY</u>	<u>LOCATION</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
SIC = 36 :ELECTRICAL EQUIPMENT (Cont.)									
119/7301		ANALOG DEVICE							
119/1717	3661	AT & T					6	6	
119/2122	3648	CHAPMAN MANUF.					8	8	
119/124		DUPONT NEN PROD.)	7	7	7	7	7	7	CL
119/1448	3648	ELECTRO POWER					4	8	
119/1193		HG. VOLTAGE ENG.							
119/1430/1	3662	KLOSS VIDEO CP.	13	13	13	13	13	13	
119/1668	3648	LEE PRODUCTS				26	26	26	
119/2353	3646	LITECONTROL CP.				49	68	23	
119/1446	3416	M/A COM. OMNI				14	14	14	CL
119/2105	3621	OLSEN MACH & TL					8	8	
119/210		OMNI SPEC (Givid)	9	9	9	9	9	9	
119/874	3674	TERADYNE INC.				43	43	43	
119/1295		THERM ELECTRON	6	6	6	6	6	6	
119/1432	3679	THE VAN KOUREN					5	5	
119/1620	3679	TYMPANIUM					4	4	
120/37	3679	AEROVAX IND.				16	17	287	24
120/299	3679	COLUMB ELEC.					5	5	
120/142	3675	CORNELL DUBIL.				51	32	32	
120/298	3673	ISOTRONICS					6	6	
121/365		UNITRODE CORP.		30	30	30	30	30	
120/892		KILBURN GLASS							
TOTAL			840	1129	1146	1512	1220	1354	102

SIC = 37 :TRANSPORTATION EQUIPMENT									
119/2391		BOSTON WHALER	NORWELL	56	57	55	84	107	110
119/2422		BOSTON WHALER	ROCKLAND	83	87	84	15	113	93
119/184		GENERAL DYNAM.	QUINCY	32	45	156	235	293	274
119/131		GENERAL ELECT.	EVERETT				8	8	0
119/138	3724	GENERAL ELECT.	LYNN	33	4	34	34	34	18
119/799	3724	GENERAL ELECT.	MEDFORD				24	24	24
119/1621	3714	GUARDIAN CORP.	BOSTON				9	9	10
119/1427	3629	MIDLAND ROSS	CAMBRIDGE					6	6
119/1730		N.E. TELEGR.	CAMBRIDGE					7	7
119/601		RAYTHEON COMP.	BEDFORD	1	1	1	1	9	9
119/1234		SEMLINE INCORP.	WESTWOOD	34	35	35	35	35	35
119/7659		WALBAR INC.	PEABODY		54	55	55	0	0
120/82		AUGAT INC.	ATTLEBORO				9	9	13
121/341		AMER. POW. DEV.	ANDOVER		11	11	11	11	11
121/197		RAYTHEON CO.	LOWELL		16	16	56	54	33
TOTAL				239	310	370	576	719	643

**CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

#	FACILITY		LOCATION	1981	1982	1983	1984	1985	1986	1987
C = 38	<u>:INSTRUMENTATION AND RELATED PRODUCTS</u>									
0/1669	ALLIED INSTRUM.	3811	WATERTOWN	-	-	-	-	4	4	4
0/426	BLH ELECTRONICS	3823	WALTHAM	14	14	14	14	14	14	14
0/1296	FENWALL INC.	3822	ASHLAND	-	-	35	35	158	142	101
0/1064	FENWAL INC.	3321	ASHLAND	24	24	24	13	25	17	30
0/1297	GENERAL ELECT.	3829	WILMINGTON	-	33	31	31	31	31	31
0/436	INSTRON CORP.	3829	CANTON	5	5	5	5	5	5	0
0/1653	JARFELL ASH DIV.	3822	WALTHAM	4	4	4	4	4	4	0
0/592	JERGUSON GAGE	3823	BURLINGTON	7	7	7	7	7	7	7
0/1160	MKS INSTRUMENTS	3823	BURLINGTON	-	10	10	10	10	10	10
0/1162	NORTHROP CORP.	3811	NORWOOD	48	37	38	38	38	38	38
0/1161	NORTHROP CORP.	3811	NORWOOD	82	83	84	76	76	96	128
0/264	POLAROID CORP.	3861	CAMBRIDGE	-	7	7	15	15	8	8
0/302	POLAROID CORP.	3861	NEEDHAM	-	-	-	15	15	15	1
0/465	PRINTED CIRC.	3679	WOBURN	2	2	2	2	389	383	315
0/725	TELECHRON	3873	ASHLAND	38	30	29	23	29	29	24
0/1596	TELECHRON INC.	3622	ASHLAND	-	-	-	35	35	35	Cl.
0/161	HILSINGER CORP.	----	PLAINVILLE	26	25	27	27	0	0	0
0/75	POLAROID CORP.	3861	FREETOWN	-	-	-	30	22	19	47
0/169	ACCUTEST CORP.	3822	CHELMSFORD	7	7	7	7	7	7	0
0/216	HEWLETT PACK.	3841	ANDOVER	-	17	18	18	18	18	0
0/1112	NASHUA CORP.	3861	CHELMSFORD	-	62	65	65	84	84	84
			TOTAL	257	367	452	405	985	966	842

C = 39	<u>:MISC. MANUFACTURING INDUSTRIES</u>									
0/1143	MOBIL SOLAR EN.		WALTHAM	6	6	6	6	6	6	6
0/076	L.G. BALFOUR		ATTLEBORO	34	30	33	33	33	33	8
0/79	FOSTER, INC.	3961	ATTLEBORO	-	-	-	-	-	6	6
0/046	LOW TEMP ENGIN.	3999	NORTON	-	-	-	-	-	26	26
0/869	NU-STYLE CO.	3961	FRANKLIN	-	-	-	-	-	10	0
0/393	POOLE SILVER		TAUNTON	4	Cl.	Cl.	Cl.	Cl.	Cl.	Cl.
0/341	C. RAY RANDALL		N. ATTLEBORO	69	68	68	68	7	7	18
0/066	REED & BART.		TAUNTON	20	14	12	12	6	2	2
0/89	ROBBINS CO.	3911	ATTLEBORO	-	-	-	-	-	7	7
0/065	ROSEMAR SILVER		NO. DIGHTON	16	15	16	8	8	8	8
0/006	HOW. H. SWEETS	3911	ATTLEBORO	-	-	-	-	-	5	5
0/361	WHITING & DAVIS		PLAINVILLE	31	32	32	26	27	11	11
1/289	C.R. BARD INC		BILLERICA	-	44	43	43	43	43	0
1/235	BLUMBERG CO.		NEWBURYPORT	-	14	14	14	14	14	14
1/276	NW. BAL. ATHLETIC		LAWRENCE	-	34	32	10	10	10	10
1/226	TOWLE MANUF.	3914	NEWBPORT.	-	-	-	31	31	29	29

CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
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BOSTON MASSACHUSETTS SIP ANALYSIS AREA

SR #	FACILITY	LOCATION	1981	1982	1983	1984	1985	1986	1987
SIC = 39	<u>:MISC. MANUFACTURING INDUSTRIES (Cont.)</u>								
		SIC							
119/234	ATLANT. GEL.	2899	WOBURN	-	-	-	-	34	0
119/866	BERGER INST.	5086	BOSTON	-	-	-	13	13	13
119/1601	BETH ISRAEL H.	8061	BOSTON	-	-	-	9	9	18
119/206	BIRD, INC.	2952	NORWOOD	-	-	-	-	83	14
119/507	BOSTON EDISON	4961	KNEELAND ST.	-	-	-	-	5	11
119/128	BOSTON EDISON	4911	MYSTIC-BOS.	-	-	-	73	72	103
119/12	BOSTON EDISON	4911	N. BOSTON	-	-	-	41	12	100
119/464	BOSTON GEAR	3566	QUINCY	-	-	-	-	4	0
119/491	BRAINTREE EL.	4911	BRAINTREE	-	-	-	7	7	9
119/965	CHILD LIFE	3949	HOLLISTON	-	-	-	-	-	12
119/640	CONCEPT INDUST.	3993	FRAMINGHAM	-	5	5	5	5	5
119/243	CONTINENT. CAN	3411	MALDEN	-	-	-	-	34	34
119/734	DERAN CONFEC.	2065	CAMBRIDGE	-	-	-	-	11	11
119/62	HEFRON ASPHALT	2951	WILMINGTON	-	-	-	7	4	4
119/904	HUDSON LT.+P	4911	HUDSON	-	-	-	10	10	5
119/220	MARLCO INC.	5161	MARLBORO	-	-	-	6	6	6
119/80	MS. BROK. STN.	2951	WESTON	-	-	-	6	6	6
119/271	MS. INST. TECH.	8221	CAMBRIDGE	-	-	-	19	19	19
119/581	MCI NORFOLK	9223	NORFOLK	-	-	-	-	5	1
119/578	MCI WALPOLE	9223	WALPOLE	-	-	-	-	7	7
119/267	N. ENGL. POW.	4911	GLOUCESTER	-	-	-	11	14	16
119/690	SALEM SUEDE	3111	SALEM	-	-	-	-	7	6
119/1618	SUPERIOR PROD.	7538	SOMERVILLE	-	-	-	40	40	40
119/1534	SWISSTRONICS	9999	WATERTOWN	-	-	-	20	20	20
119/115	BILTRITE CORP.	3069	CHELSEA	-	71	68	39	39	39
119/727	TRIMONT BUT.	2951	ASHLAND	-	-	-	-	6	4
119/819	WANG CENTER	7832	BOSTON	-	-	-	27	27	27
120/188	B & J MANF.	1611	N. ATTLEBORO	-	-	-	9	9	9
120/346	T.J. HOLMES	3999	NORTON	4	4	4	5	5	5
120/192	JOSTEN'S INC.	3911	ATTLEBORO	-	-	-	9	9	9
120/55	MASS AIR NAT.G.	9199	BOURNE	-	-	-	11	11	11
120/198	MOUNT VERNON S.	3914	ATTLEBORO	-	-	-	11	11	7
120/60	MONTAUP ELEC.	4911	SOMERSET	-	-	-	31	19	14
120/286	NANTUCKET ELEC.	4911	NANTUCKET	-	-	-	9	61	17
120/313	SANDLER/BOSTON	3144	NEW BEDFORD	18	Cl.	Cl.	Cl.	Cl.	Cl.
120/67	TAUNTON MUN. L.	4911	TAUNTON	-	-	-	7	8	4
120/395	TAUNTON SILVER	3914	TAUNTON	-	-	-	17	17	17
121/315	PELLON CORP.	9999	LOWELL	-	12	12	12	12	12
121/321	POPE INDUST.	6512	LOWELL	-	3	3	3	3	3
121/208	TEK COATING	3479	HAVERHILL	-	15	15	15	15	15
121/350	TRANSENE CO.	2815	ROWLEY	-	8	8	8	8	8

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BOSTON MASSACHUSETTS SIP ANALYSIS AREA

198R #	FACILITY	LOCATION	1981	1982	1983	1984	1985	1986	1987
IC = 39	:MISC. MANUFACTURING INDUSTRIES (Cont.)								
		SIC							
19/7511	AMER. ARCH. IRON	3446	BOSTON	-	-	-	5	5	5
19/1057	ARKLESS CORP.	3643	WATERTOWN	-	-	-	5	5	0
19/1602	BARWOOD MFG.	0	SOMERVILLE	-	-	-	-	-	4
19/6629	BRIDGE CLEAN	7216	BOSTON	-	-	-	5	5	5
19/1469	CAMBRIDGE	9531	CAMBRIDGE	-	-	-	6	6	4
19/93	CAMBRIDGE ELEC.	4911	CAMBRIDGE	-	-	-	4	4	0
19/1466	CAMBRIDGE H.A.	9531	CAMBRIDGE	-	-	-	8	4	4
19/1469	CAMBR. HOUS. A.	9531	CAMBRIDGE	-	-	-	-	4	4
19/1847	CHAS. DRAPER L.	8922	CAMBRIDGE	-	-	-	7	13	12
19/1191	COGEN. RLGT	4961	BOSTON	-	-	-	9	5	4
19/1748	COLE HERSEE	3699	BOSTON	-	-	-	-	-	6
19/797	GAF. BLDG. MAT.	2952	MILLIS	-	-	-	74	21	0
19/1726	EXEC. CLEAN	7216	BOSTON	-	-	-	5	5	C1.
19/1276	FISH CHEM. EQ.	5161	WALPOLE	-	-	-	-	-	58
19/2131	GILTSPUR BROS.	3993	AVON	-	-	-	18	18	18
19/1675	GOLD CROWN CL.	7212	BOSTON	-	-	-	4	5	5
19/1496	HARRY RICHMOND	3499	CAMBRIDGE	-	-	-	5	5	2
19/1681	HOUGHTON CHEM.	5161	BOSTON	-	-	-	7	7	7
120/336	L.G. BALFOUR	3961	N. ATTLEBORO	-	-	-	-	-	4
19/1668	LEE PRODUCTS	3648	EVERETT	-	-	-	26	26	26
19/2379	MARSHFIELD	7211	MARSHFIELD	-	-	-	7	7	7
19/1017	MATHEWSON CP.	3499	QUINCY	-	-	-	5	4	4
19/1899	MDC SEWAGE	9511	WINTRHOP	-	-	-	6	6	0
19/194	NEW ENG. POWER	4911	SALEM	-	-	-	-	96	0
19/1275	RAYTHEON EQUIP.	3622	WAYLAND	-	-	-	7	7	7
19/1677	RELIANCE PRINT	2741	BOSTON	-	-	-	4	7	7
19/1028	RYAN BARREL	3421	PEABODY	-	-	-	65	65	65
19/1596	TELECHRON, INC.	3873	ASHLAND	-	-	-	35	35	35
19/1055	TROUVAILLES, INC.	2500	WATERTOWN	-	-	-	7	7	7
19/50	UNI. FIRST CP.	7218	BOSTON	-	-	-	47	47	0
19/5136	WEBSTER IND.	3079	PEABODY	-	-	-	47	47	47
19/2452	SO. SHORE PUBL.	8249	HANOVER	-	-	-	10	10	10
120/813	AMERICAN DRYER	3589	F. RIVER	-	-	-	33	16	16
120/41	CANON ST. STA.	4911	N. BEDFORD	-	-	-	7	5	1
120/104	GOLD MEDAL BAK.	2051	F. RIVER	-	-	-	-	13	13
120/60	HARVARD SWEETS	3911	ATTLEBORO	-	-	-	5	5	C1.
120/196	MARATHON	3911	ATTLEBORO	-	-	-	6	6	6
120/918	PACKAGING IND.	9999	BARNSTABLE	-	-	-	25	25	3
120/397	R.M. PACKER	5171	TISBURY	-	-	-	-	10	10
120/908	PRINCESS HOUSE	9999	DIGHTON	-	-	-	40	40	40

**CATEGORIZATION OF MISCELLANEOUS SOURCES OF VOC:
SOURCES WITH THE POTENTIAL TO EMIT LESS THAN 100 TONS (Cont.)**

BOSTON MASSACHUSETTS SIP ANALYSIS AREA

<u>SR #</u>	<u>FACILITY</u>	<u>LOCATION</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
119/202	NEW ENG. M.								
119/2527	SHAWMUT MILLS	9999 W. B/WATER	-	-	-	-	30	30	49
119/2436	VENTURE TAPE	2641 ROCKLAND	-	-	-	-	10	10	10
121/7	BOSTON & RAIL	4111 BILLERICA	-	-	-	-	6	5	5
121/259	GEORGE BROX	1442 DRACUT	-	-	-	-	-	5	0
121/901	FORT DEVENS	9711 FT. DEVENS	-	-	-	-	7	25	3
121/242	GRTR. LAWRENCE	9511 N. ANDOVER	-	-	-	-	6	6	0
121/821	HAVERHILL IND.	9511 HAVERHILL	-	-	-	-	15	15	0
121/258	KEATING MAT	2951 DRACUT	-	-	-	-	4	4	4
121/261	MASS. REFUSE	4953 N. ANDOVER	-	-	-	-	-	-	26
121/228	NEW ENG. POWER	4911 NEWBURYPORT	-	-	-	-	4	4	4
121/202	N.E. MEM. HOSP.	8062 STONEHAM	-	-	-	-	-	-	4
TOTAL			240	434	432	811	1391	1555	1058
MISCELLANEOUS TOTAL (TPY)			4082	5398	5444	8201	10384	11045	8672
REGIONAL TOTAL (TPY)			33226	33634	33707	34394	30163	29820	23099
(KG/DY)			82580	83593	83775	85483	74967	74115	57410

WORCESTER SIP ANALYSIS AREA
 DEMONSTRATION OF REASONABLE FURTHER PROGRESS
 NMOC EMISSIONS KG/DAY 1980-1987

SOURCE	1980	1981	1982	1983	1984	1985	1986	1987
POINT	26273	26127	25270	27730	18729	17233	14759	10900
AREA	41417	36500	34689	32630	32376	30549	30583	31093
MOBILE	41709	38074	34346	24783	21920	20154	18273	15677
TOTAL	109399	100701	94305	85143	73025	67936	63615	57670
PROJECTED rfpwor87	109451	100416	94606	90550	84256	66882	64193	61501

AQCR 118: CMAQCR Total VOC Emissions (TPY)

METAL FURNITURE PRODUCTION

SR#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
272	Gem Industries	Gardner	2514	21	20	20	20	51	43	27
376	Mason & Parker	Winchester	2514	4	4	4	4	4	4	0
TOTAL				25	24	24	24	55	47	27

WOOD FURNITURE PRODUCTION

398	S. Bent Bros.	Gardner	2511	-	-	208	119	119	146	171
1005	G. Bent Co.	Gardner	2511	-	-	-	10	10	10	Cl.
960	Ipswich Ind.	Wichendon	2511	-	-	-	20	20	20	20
414	L.Z. Kamman	Worcester	2511	79	80	79	79	79	79	79
270	Albert M. Lock	Rowe	2511	70	69	68	67	67	67	67
415	Nichls.&Stone	Gardner	2511	145	147	144	92	92	89	89
481	Temple Stuart	Templeton	2511	124	94	93	160	114	160	159
TOTAL				418	389	591	547	501	571	585

PLASTIC PRODUCTS MANUFACTURE

997	Clinton Plast.	Clinton	3079	44	44	43	54	54	88	70
054	Polysar Resins	Leominster	3079	201	197	193	11	11	11	11
TOTAL				245	241	236	65	65	99	81

DRY CLEANERS

677	City Cleaners	Fitchburg	7216	42	42	44	44	44	44	0
252	White Cleaners	Worcester	7210	38	38	40	40	0	0	0
TOTAL				80	80	84	84	44	44	0

MISCELLANEOUS POINT SOURCES GREATER THAN 100 TONS PER YEAR

142	American Opt.	Southbridge	3229	152	156	158	453	274	274	40
543	Aztec Indust.	W. Brookfield	3293	244	250	253	74	74	74	Cl.
092	Cranston Print	Webster	2261	809	770	752	499	476	460	393
586	Vellumoid	Worcester	3293	305	302	302	1	1	17	1
TOTAL				1510	1478	1468	1027	825	825	434

AQCR 118: CMAQCR - VOC SOURCES (Total TPY)

GASOLINE AND CRUDE OIL STORAGE

SR#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
934	Shell Oil Co.	W. Boylston	5171	42	42	42	42	42	42	39

CHEMICAL MANUFACTURE

501	Advance Coatings	Westminster	2820	21	21	21	21	21	21	Cl.
051	American Hoechst	Leominster	2820	126	126	124	Cl.	Cl.	Cl.	Cl.
050	Borden Chemical	Leominster	2820	90	90	89	89	89	0	0
449	Foster Grant Cp.	Leominster	2820	127	127	125	83	54	54	19
470	Industrial Poly.	Shrewsbury	2295	197	198	193	6	6	6	6
452	Lewcott Chemical	Millbury	2295	68	68	67	67	67	67	67
480	Lilly Industrial Coatings	Templeton	2851	70	70	69	69	69	41	41
294	Lycon, Inc.	Leominster	2851	-	-	-	7	7	7	7
265	Nylco Corp.	Clinton	2295	-	-	-	59	59	59	44
455	Polyclad Lamin.	Millbury	2295	246	247	241	293	261	790	371
312	Polyform Corp.	Westboro	2820	39	39	38	39	0	16	16
343	Lewcott	Worcester	2295	25	25	25	25	0	Cl.	Cl.

TOTAL	1009	1011	991	726	633	1061	571
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PAPER COATING OPERATIONS

510	Custom Coat. & Laminating	Worcester	2641	239	241	239	308	290	222	22
835	James River #10	Fitchburg	2640	3420	3502	3471	1679	1596	0	0
394	James River - Fitchburg	Fitchburg	2641	771	790	782	108	107	176	114

TOTAL	4430	4532	4492	2095	1993	398	136
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FABRIC COATING OPERATIONS

120	Robinson Thread	Worcester	2280	166	159	156	75	1	1	90
911	Vertipile	Leominster	2260	248	96	94	27	27	3	3

TOTAL	414	255	250	102	28	4	93
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VINYL COATING OPERATIONS

78	Flexcon Inc.	Spencer	2640	684	617	611	504	527	532	586
998	Flexcon Inc.	Spencer	2641	786	695	689	799	784	686	208

TOTAL	1470	1312	1300	1303	1311	1218	794
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MISCELLANEOUS METAL PRODUCTS

422	Simplex Tm. Rec.			25	28	28	28	0	0	0
004	L.S. Starrett	Athol	3545	17	17	17	17	0	0	92

TOTAL	42	45	45	45	0	0	92
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DEGREASING

143	Bay State Abras.	Westboro	3291	246	185	190	1	1	11	11
313	Central Coat. Co.	W. Boylston	3570	69	70	68	64	16	16	16
111	Cincinatti Mil.	Worcester	3541	31	29	28	28	2	76	50
99	ATF Davidson Co.	Northbridge	3569	10	9	9	9	9	9	Cl.

TOTAL	356	293	295	106	28	112	77
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AQCR 118: CMAQCR Total VOC Emissions (TPY) (Cont.)

MISCELLANEOUS POINT SOURCES LESS THAN 100 TONS PER YEAR (Cont.)

SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
138	Charles G. Allen	Barre	3321	7	7	0	2	2	3	5
679	Anwelt Shoe Co.	Fitchburg	3131	-	-	-	8	8	0	0
685	Aronson Tire	Auburn	3011	-	-	-	3	3	3	3
103	Astra Pharm.	Worcester	2833	38	38	37	37	37	Cl.	Cl.
0141	Baldwinville Pr.	Templeton	2631	-	-	-	-	-	4	0
1069	Bellecraft Wood.	Wichendon	2511	-	-	36	36	36	36	36
999	H.H. Brown Shoe	Worcester	3141	33	35	35	35	35	35	35
1005	The Factory Stone	Gardner	2511	-	-	62	62	62	62	Cl.
0014	E.R. Buch Co.	Clinton	2511	-	-	58	58	58	58	33
949	C.P.C. Engin.	Sturbridge	3410	-	-	9	9	9	9	9
0131	Centr. Steam PCT	Fitchburg	2611	-	-	9	4	4	3	7
0402	Chair Cty. Up.	Gardner	2511	-	-	25	25	25	25	0
0404	Conant Ball Co.	Gardner	2511	-	-	39	22	22	11	14
353	Digital Equip.	Shrewsbury	3679	-	-	-	-	18	18	18
1084	Eddington Thr.	Worcester	2281	38	38	37	37	37	37	37
0317	Eustis Enterp.	Wichendon	2511	-	-	54	54	25	25	25
109	L. Farber Co.	Worcester	3149	18	19	19	19	0	0	0
135	Fitchburg Fdry.	Fitchburg	3321	30	28	28	28	28	28	Cl.
926	Geo. Frost Co.	Shirley	3100	23	22	22	4	4	4	4
931	Furniture Loft	Worcester	2500	5	5	5	5	0	0	0
205	Gateway Pdcts.	Leominster	3641	-	-	89	89	89	89	Cl.
668	General Wire	Worcester	3469	80	78	76	76	76	76	76
0430	Gilbertv. Mills	Hardwick	2261	-	-	66	66	66	66	66
0412	C.H. Hartshorne	Gardner	2512	-	-	4	14	14	14	14
0137	Henley Lundg.	Shrewsbury	2952	-	-	11	11	11	11	0
802	Henry L. Hanson	Worcester	3541	4	4	4	4	4	4	0
546	Heritage Cabin	Fitchburg	2434	-	-	-	4	4	4	4
0200	Howard Bor. Mfg.	Auburn	3554	-	-	9	14	14	14	14
0396	Hub Fabr.	Everett	3069	-	-	10	16	16	16	16
017	FL. Suprenant	Clinton	3315	47	46	45	83	83	83	81
518	Jamesbury Corp.	Worcester	3823	5	5	5	5	0	0	0
296	P.J. Keating	Lunenburg	2951	-	-	-	9	9	9	0
403	Collier Keyworth	Gardner	3429	-	-	-	-	6	68	51
0124	L.F.E. Corp.	Clinton	3499	-	-	37	19	19	19	19
0273	Modern Contract	Gardner	2511	-	-	-	-	-	30	28
0202	Montrose Pdcts.	Auburn	3357	-	-	5	9	9	9	9
1018	Monson Chem.	Leominster	2869	-	-	15	15	15	15	1
0134	Nation. Perfor.	Clinton	3469	-	-	6	6	3	3	3
0025	N. Eng. Newspaper	Millbury	9999	-	-	-	-	-	4	4
0115	Norton Co.	Worcester	3291	-	-	-	-	-	5	239
300	Phalo Co (Belden)	Shrewsbury	3355	63	62	61	61	61	61	61
428	Reed Rolling Th.	Holden	3451	-	-	-	26	26	26	26
073	Sampson Ocean	Shirley	2298	6	6	5	5	0	1	1
545	S.A.Y. Ind.	Leominster	2869	-	-	-	-	14	14	14
0035	Seaman Paper Co.	Templeton	2611	-	-	23	20	20	26	0
664	Shrew's Elec.	Shrewsbury	4911	-	-	-	-	5	5	0
0030	Simmonds Cut.	Fitchburg	3425	-	-	-	27	27	18	19
442	Stan Cast, Inc.	Leominster	3369	-	-	-	8	8	8	8

QCR 118: CMAQCR Total VOC Emissions (TPY)

ISCELLANEOUS POINT SOURCES LESS THAN 100 TONS PER YEAR (Cont.)

SR	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
54	Consol. Ct.	Hopedale	3573	-	-	-	-	-	21	21
2041	Gen. Rad.	Bolton	3829	-	-	-	-	-	6	6
88	Hardwick Knit	Warren	4961	-	-	-	-	-	-	18
136	Oxford Asph.	Oxford	3531	-	-	-	-	-	-	13
2420	Std. Chair	Gardner	2511	-	-	28	28	28	28	28
350	Ste. Mut./Amer.	Worcester	6410	4	4	4	4	8	4	0
0027	Rolland Fitc.									
	Paper	Fitchburg	2641	-	-	4	4	4	0	0
0803	Temple Stuart	Templeton	2511	-	-	35	35	35	35	35
0952	Seth Thomas	Fitchburg	2511	-	-	54	54	54	54	54
0935	Univ. Rundle	Leominster	3079	-	-	80	80	80	80	80
937	Upper Blskn.	Millbury	4952	-	-	-	-	-	-	18
0541	Wyman Gordon Co.	Worcester	3462	-	-	-	-	-	5	3
335	Warn. & Swasey	Worcester	3500	10	9	9	15	15	15	0
059	Eddington Thread	Worcester	2281	-	-	38	1	31	75	101
070	Whit. Allen	Ashbnham.	2511	-	-	83	55	55	50	38
057	Wireway Co.	Sterling	3446	11	11	11	11	11	11	11
032	Woodburg Co.	Worcester	2751	11	11	11	11	11	11	11
04	Wright Line	Worcester	2520	38	37	36	36	65	64	40
TOTAL				471	465	1339	1369	1409	1518	1457
REGIONAL TOTAL				10512	10167	11157	7535	6934	5939	4386
KG/DY				26127	25270	27730	18729	17233	14759	10900



SPRINGFIELD MASSACHUSETTS SIP ANALYSIS AREA
 DEMONSTRATION OF REASONABLE FURTHER PROGRESS
 NMOC EMISSIONS IN KG/DAY

SOURCE		1980	1981	1982	1983	1984	1985	1986	1987
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POINT	SOURCE	44044	42355	40973	39869	38348	26937	15401	11736
AREA	SOURCE	37397	35873	34341	32801	33075	33075	33493	34297
MOBILE	SOURCE	51625	48282	42405	25197	29311	25097	21919	18741
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TOTAL		133066	126510	117719	97867	100734	85109	70813	64774
PROJECTED		133395	127303	119176	114457	107138	88786	84706	83383
rfpspr87									

**Springfield Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)**

MISCELLANEOUS POINT SOURCES GREATER THAN 100 TONS PER YEAR

AQCR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
117	002	Arnold Print	Adams	2261	248	235	237	C1.	C1.	C1.	C1
042	125	Forbes&Wright	Monson	2500	70	120	68	64	64	64	C1
TOTAL					318	355	305	64	64	64	

GASOLINE AND CRUDE OIL STORAGE

042	202	Mobile Oil Cp.	Sprnfld.	5157	71	97	97	92	92	104	5
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CHEMICAL MANUFACTURE

117	29	General Elec.	Pittsfd.	2821	30	31	31	31	88	88	
042	185	Haynes Coat.	Chicopee	2851	33	33	34	34	34	34	3
	86	Monsanto Co.	Brch.Bnd.	2821	1515	1745	1729	2597	1256	502	39
TOTAL					1655	1886	1869	2662	1378	624	42

MISCELLANEOUS METAL PRODUCTS

042	76	Am. Bosch-Amb.	Sprnfld.	3714	163	172	170	4	1	1	C1
	107	Columbia Man.	Westfield	3741	131	139	137	107	77	31	2
	174	Digital Eq.	Westfield	3571	95	152	148	90	34	42	2
	149	E. Etch.&Mfg.	Chicopee	3479	73	76	75	55	45	45	4
	25	Package Mach.	E.Lngmdw.	3559	24	47	46	0	7	2	
	14	Spaulding N.A.	Chicopee	3949	742	534	536	646	253	117	11
	705	Sterling Rad.	Westfield	3433	13	14	13	25	25	25	2
117	28	General Elect.									
		Transformer	Pittsfd.	3612	195	190	184	190	347	220	14
	24	Sprague Elect.	N. Adams	3679	204	102	99	5	3	42	
TOTAL					1640	1426	1407	1981	792	525	39

FABRIC COATING OPERATIONS

042	16	Facemate Corp.	Chicopee	2261	-	-	-	3	3	3	
	497	Ludlow Text.	Ludlow	2200	-	-	-	17	17	20	2
117	78	W.R. Grace	Adams	3069	802	762	767	345	420	186	16
	145	A.H. Rice co.	Pittsfd.	2284	8	9	9	65	65	60	6
TOTAL					810	778	776	430	505	269	24

MAGNETIC WIRE COATING

117	40	G.E. Ordnance	Pittsfd.	3489	11	12	12	12	130	0	0
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Springfield Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year)

PER COATING OPERATIONS

CR	SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
	798	Champion Int.	Chicopee	2651	61	60	65	65	65	56	56
	313	Chartpak	Nrhampt.	2641	23	23	23	27	27	8	8
	160	Decorated Cov.	Hatfield	2641	602	638	621	748	615	657	32
	195	Dennison Nat.	Holyoke	2782	45	45	45	16	16	16	16
	212	Dielectric Pol.	Holyoke	2641	-	-	-	40	40	120	5
	148	Dow Jones	Chicopee	2711	5	5	5	5	5	5	0
	121	Erving Paper	Erving	2647	42	22	18	121	118	346	304
	181	Hampden Paper	Holyoke	2641	398	422	420	391	222	80	39
	172	Hano Forms Br.	Spnfld.	2761	41	15	15	34	34	34	34
	128	Hazen Paper	Holyoke	2754	288	297	297	93	104	106	80
	145	Holyoke Card	Spnfld.	2641	212	244	220	186	169	114	35
	193	James River	S. Hadley	2641	5467	5093	4859	3972	2562	1120	1558
	175	James River	W.Spnlfd.	2621	178	189	185	251	219	167	66
	218	J.T. Leigh	Spnfld.	2641	-	-	-	50	50	50	50
	194	Ludlow Cor. P.	Holyoke	2641	126	134	133	Cl.	Cl.	Cl.	Cl.
	189	Kanzaki									
		Special Papers	Ware	2641	928	984	977	257	338	87	0
	216	Ludlow Spec.P.	W.Spnlfd.		-	-	-	-	-	-	20
	208	Milton Bradley	E.Lngmdw.	3944	2	2	2	43	70	56	53
	573	Package Pring	W.Spnlfd.	2751	-	-	-	33	33	33	50
	157	Sullivan Paper	W.Spnlfd.	2641	451	478	477	550	321	47	42
	716	Texon Inc.	Holyoke	2621	4	3	3	3	3	3	Cl.
	074	Texon Inc.	S. Hadley	2621	175	186	187	131	93	0	Cl.
	152	Texon Inc.	Russel	2621	-	-	-	18	16	12	0
	126	Texon; Coated	Westfield	2621	6	6	-	35	36	41	2
	360	Walter Drake	Holyoke	2641	39	40	40	33	33	33	0
	775	Westvaco; U.S.	Sprnflfd.	2642	503	533	530	270	330	76	98
	192	Xidex Corp.	Holyoke	2641	1224	1298	1210	1126	752	0	Cl.
	14	The Mead Corp.									
		Morart Div.	S. Lee	2621	341	194	195	237	127	69	0
TOTAL					11450	10875	10517	8663	6398	3336	2548

GREASING

2	250	Acme Chain	Holyoke	3496	-	-	-	6	6	6	6
	180	Atlas Copco	Holyoke	3563	16	16	15	15	15	15	Cl.
	201	Ingersoll-Rand	S. Drfld.	3423	39	40	40	40	40	40	40
	612	Savage Indust.	Westfield	3484	28	27	27	27	27	27	27
	89	Smith & Wesson	Sprnflfd.	3484	47	22	23	46	40	40	23
	52	Zero Corp.	Monson	3499	40	41	41	23	23	23	23
TOTAL					170	145	147	161	151	151	119

Springfield Massachusetts SIP Analysis Area
VOC Emissions in Tons Per Year

SR#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
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PLASTIC PRODUCTS MANUFACTURE

214	Mohawk Plastic	Montague	3079	-	-	-	10	10	10	10
537	Package Print.	W. Sprnfield.	3079	28	29	28	28	28	28	28
TOTAL				28	29	28	54	38	38	38

WOOD FURNITURE PRODUCTION

300	Geo. B. Bent	Orange	2511	49	48	47	47	47	C1.	C1.
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DRY CLEANERS

173	Adams Laundry	Adams	7216	20	18	18	18	24	24	0
294	Belmont Laund.	Springfield	7216	10	9	9	9	9	0	0
146	Roxy Cleaners	Pittsfield	7210	7	7	7	7	14	14	14
168	Center Clean.	Chicopee	7210	7	7	7	7	7	7	7
163	City Cleaners	Springfield	7216	8	7	7	8	8	8	8
352	Crown Serv.			3	3	3	3	3	3	C1.
196	Flair Cleaners	Springfield	7210	10	9	9	9	9	9	9
382	Flair Cleaners	Springfield	7210	13	12	12	12	12	12	12
198	Flair Cleaners	Springfield	7210	8	7	7	7	7	7	7
167	General Drive-In Cleaners	Holyoke	7216	3	3	3	6	6	6	6
162	Herman Bosbach	Holyoke	7216	5	5	5	5	5	5	5
434	Hghland. Laun.	Holyoke	7212	7	7	7	7	7	7	7
169	Holiday Clean.	Holyoke	7216	4	4	4	7	7	7	7
164	Lapides Clean.	Springfield	7216	7	7	7	7	7	7	7
579	Park Clean. & Dyers	Springfield	7210	8	7	7	7	7	7	7
199	Pride Cleaners	Springfield	7210	7	7	7	7	7	7	C1.
197	Shea Cleaners	Springfield	7210		6	6	6	6	6	6
699	Stanley Clean.	Westfield	7216	17	15	15	7	7	7	7
159	Stetson Sanitone Cleaners	Pittsfield	7216	14	13	13	13	13	5	5
161	Treet Cleaners	N. Adams	7216	6	6	6	6	6	6	6
464	Unifirst Corp.	Springfield	7218	77	77	78	22	22	22	22
165	W & W Cleaners	Ludlow	7216	6	6	6	6	6	6	6
TOTAL				252	243	243	192	199	182	148

Springfield Massachusetts SIP Analysis Area
VOC Emissions in Tons Per Year

87 SC. POINT SOURCES LESS THAN 100 TPY

R#	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
70	American Saw	E. Longmeadow	3425	17	18	18	18	18	18	18
10 77	Anderson & Son	Westfield	3479	51	53	53	53	26	33	28
28 31	Apollo Plast.	Northampton	3079	11	11	11	11	11	11	11
44	F.A. Bassett	Springfield	2752	9	9	9	9	9	9	9
38 79	Bendix Corp.	Greenfield	3545	11	11	11	11	11	11	11
04	Chemigraphic	Ludlow	3479	25	26	26	26	26	26	26
55	Decor. Metal	Westfield	3479	10	10	10	10	12	12	12
76	Densal Mfg.	W. Sprnfield.	3479	14	14	14	14	14	14	14
1. 32	Florence Cask.	Northampton	3995	20	20	20	24	24	24	24
39	E.H. Friedrich	Holyoke	3442	6	6	6	6	6	6	6
27	Hodge Manuf.	Springfield	3499	23	23	23	23	23	23	23
52	Indust. Etch	E. Longmeadow	3479	9	9	9	9	9	9	9
97	Ludlow Textile	Ludlow	2200	25	24	24	24	24	20	20
07	McKinstry Met.	Chicopee	3444	18	18	18	18	18	18	18
0 28	N.M. Indust.	W. Sprnfield.	2531	28	29	29	29	29	29	40
14 40	Nonotuck Man.	S. Hadley	3351	4	4	4	3	3	3	3
7 70	Northampton	Northampton	3315	15	15	15	11	11	11	11
8 36	Phillip Mfg.	Easthampton	3442	6	6	6	6	6	6	6
1. 56	Plastic Pack.	W. Sprnfield.	3079	10	10	9	29	29	29	29
9 09	R.E. Phelon	E. Longmeadow	3694	14	14	14	14	14	14	14
12 97	Rexcel Div.:									
7	Dart & Kraft	Ludlow	3079	4	4	4	4	16	16	16
58	Rodney Hunt	Orange	3321	5	5	5	7	7	0	0
6 03	Rogers, Lunt & Bowlen	Greenfield	3914	15	15	15	9	14	14	0
5 43	Springfield Wire	Springfield	3999	21	23	23	29	29	29	29
7 35	Stanley Home Prod.	E. Hampton	2842	20	20	20	20	0	0	0
7 58	The October Company	Easthampton	2499	5	5	5	5	5	5	5
1. 22	TRW Electron.	S. Hadley	3357	9	9	9	9	9	9	9
6 38	Tubed Prod.	Easthampton	3079	12	12	12	12	12	12	12
7 32	Van Norman Machine Co.	Springfield	3541	6	6	6	6	6	6	C1.
5 53	Westfld. Coat.	Westfield	2851	4	4	4	3	3	3	3
6 61	Westover Knit.	Springfield	2257	13	13	13	13	13	13	13
22 06	WICO/Presto- lite Elect.	W. Sprnfield.	3694	20	18	18	18	18	18	C1.

Springfield Massachusetts
Total VOC Emissions - TPY

MISC. POINT SOURCES LESS THAN 100 TPY

SR#	FACILITY	LOCATION	SIC	1980	1981	1982	1983	1984	1985	1986	1987
252	Advnce.Offset	Holyoke	2795	-	-	-	-	42	42	42	42
290	By.Ste.Mills	Holyoke	2262	-	-	-	-	10	10	10	10
054	Cool.Dick.										
	Hospital	Nrhamptn.	8062	-	-	-	-	6	6	0	0
159	E. Casket										
	Hdwre.	W.Spnfld.	3429	8	8	8	8	8	5	5	5
187	Fount. Plt.	W.Spnfld.	3471	8	8	8	8	8	8	8	8
130	Graph. Coat.	Holyoke	2759	-	-	-	-	15	15	30	30
408	Gravure Eng.										
	Litt. Indus.	Holyoke	2753	8	8	8	8	8	8	8	8
147	Haarman Stl.	Chicopee	3441	8	9	9	9	9	9	9	Cl.
047	Holyoke Wat.										
	Mt. Tom	Holyoke	4961	-	-	-	-	15	13	0	0
614	Jas. Riv.	Holyoke	3861	-	-	-	-	3	3	0	0
467	Judd Wire,										
	HVEC Div.	Montaque	3357	7	7	7	7	7	0	0	0
476	Lamson &										
	Good Mfg.	Shelburne	9999	7	7	7	7	7	0	0	0
217	Laurino Pk.	W.Spnfld.	3752	-	-	-	-	40	40	40	40
478	Lane Constr.	Westfield	2951	-	-	-	-	5	6	0	0
395	Lngvw. Fibre	W.Spnfld.	2653	-	-	-	-	3	3	0	4
001	Mass Whole-										
	sale Elec.	Ludlow	4911	-	-	-	-	73	78	0	0
506	Mayhew Steel										
	Prod.	Buckland	3423	7	7	7	7	7	7	7	7
509	Milton Brad.	E.Lngmdw.	3944	-	-	-	-	-	-	17	20
519	Montgomery	Hadley	0181	-	-	-	-	6	6	12	12
343	Natnl. Felt	E.Hampton	2291	-	-	-	-	17	17	4	0
129	N.E. Etch.			7	7	7	7	7	7	7	7
063	Palmer Pav.	Palmer	2951	-	-	-	-	6	9	0	0
078	Palmer Pav.	Palmer	2951	-	-	-	-	-	-	5	0
228	Polysar Inc.	Spnfld.	2821	-	-	-	-	-	-	7	7
203	F.L.Roberts	Spnfld.	5171	8	8	8	8	8	8	8	8
215	J.P.Stevens	E.Hampton	3069	-	-	-	-	8	8	8	8
005	Tenn. Gas										
	Trans.	Agawan	4923	-	-	-	-	4	4	0	0
604	Rosen Text.	Agawam	3552	-	-	-	-	4	4	4	4
095	Titeflex Cp.	Spnfld.	3041	-	-	-	-	34	34	38	28
720	Trew Corp.	Deerfld.	2951	-	-	-	-	3	3	0	0
117	W.Ms. Elec.	W.Spnfld.	4911	-	-	-	-	14	10	0	0
158	Wrap Around	W.Spnfld.	3555	7	7	7	7	3	3	3	3

Springfield Massachusetts SIP Analysis Area
(VOC Emissions in Tons Per Year) (Cont.)

SR #	FACILITY	LOCATION	SIC	1981	1982	1983	1984	1985	1986	1987
76	Carol Cable	Willmstn.	3357	4	4	4	0	8	1	0
152	Cap Film	Lee	3079	25	25	26	10	10	10	30
39	Crane Co.	Pittsfld.	2621	-	-	-	13	23	0	0
62	Diamond Fiber	Palmer	2646	-	-	-	-	-	-	7
77	General Photo	Willmstn.	3861	-	-	-	94	74	74	16
77	Photech Im.	Willmstn.	3861	-	-	-	-	-	-	16
485	Rodney Huat	Orange	3321	-	-	-	-	-	-	7
149	Sheaff. E. Tx.	Pittsfld.	2649	23	23	24	10	10	14	0
4	Vicon Recovery	Pittsfld.	4953	-	-	-	81	98	0	0
TOTAL				588	592	593	1071	1044	904	746
REGIONAL TOTAL TPY				17042	16486	16041	15429	10838	6197	4722
KG/DY				42355	40973	39869	38348	26937	15401	11736



APPENDIX B

POINT SOURCES: STATUS OF COMPLIANCE 1987

**VOC Compliance Status of Sources Subject to 7.18
Summary Report 1987**

The following pages contain an update to January 1, 1988, of the compliance status of all sources subject to 310 CMR 7.18. For this report, sources have been categorized into several areas depending on their efforts to come into compliance with our regulations.

The categories reported include:

- A - Facility in compliance with emissions limitations
- B - Facility working towards compliance on compliance schedule
- C - Facility has submitted compliance strategy to regional office; decision pending
- D - Facility is subject to permit restriction with reporting requirements
- E - Facilities are minor sources - no annual tracking.

To summarize the results of this study:

- 16 - Sources were found to be working on compliance schedules toward eventual compliance with the regulations.
- 8 - Sources are awaiting approval of compliance plans or modified compliance plans.
- 5 - Sources have actual emissions less than the "de minimus" cut point of the regulations and have, therefore, taken an emissions permit restriction with reporting requirements.
- 365 - Sources have unknown compliance status. (Only sources with this designation are 7.18(a) cutback asphalt sources).

This summary covers the regulated sources subject to 310 CMR 7.18(3) through 7.18(17).

Questions or comments regarding this summary should be directed to George Hailer (292-5773).

7.18 COMPLIANCE STATUS REPORT: MET. BOSTON/NE REGION

<u>7.18(4)</u>	<u>Metal Can Surface Coating</u>	
121/088	Crown Cork & Seal, Lawrence	B
<u>7.18(7)</u>	<u>Automobile Surface Coating</u>	
119/427	General Motors, Framingham	B
<u>7.18(9)</u>	<u>Cutback Asphalt</u>	
	115 Sources	E
<u>7.18(11)</u>	<u>Surface Coating Misc. Metal Parts</u>	
121/281	Spray-O-Matic, Lawrence	B
<u>7.18(12)</u>	<u>Graphic Arts</u>	
119/1918	Linvure Co., Somerville	C
<u>7.18(14)</u>	<u>Paper Surface Coating</u>	
119/7552	Hysil Mfg., Revere	C
119/573	Polaroid Corp., Waltham	B
119/3766	MADICO, Inc., Woburn	B
<u>7.18(15)</u>	<u>Fabric Surface Coating (16) Vinyl Surface Coating</u>	
087	Bradford Industries, Lowell	B
050	Majalite Corp., Lowell	C
114	Plymouth Rubber, Canton	C
093	Vernon Plastics, Haverhill	B
082	Weymouth Art & Leather, Braintree	B
<u>7.18(17)</u>	<u>RACT</u>	
119/427	General Motors, Framingham	A
119/139	N. American Phillips, Lynn	A

7.18 COMPLIANCE STATUS REPORT: CENTRAL REGION

<u>7.18(9)</u>	<u>Cutback Asphalt</u>	
	- Approx. 75 sources -	E
<u>7.18(11)</u>	<u>Surface Coating Misc. Metal Parts</u>	
119/1812	Lista International, Holliston	D
<u>7.18(15)</u>	<u>Fabric Surface Coating (16) Vinyl Surface Coating</u>	
120/134	Archer Rubber Co., Milford	B
118/452	Lewcott Chemical, Millbury	B
<u>7.18(17)</u>	<u>RACT</u>	
118/92	Cranston Print Works, Webster	A
118/120	Robinson Thread Co., Worcester	A
118/142	American Optical, Southbridge	A
118/543	Aztec Industries, N. Brookfield	A
118/481	Temple Stuart, Templeton	A
118/415	Nichols & Stone, Gardner	A
118/398	S Bent Brothers, Gardner	A

7.18 COMPLIANCE STATUS REPORT: WESTERN REGION

<u>7.18(9) Cutback Asphalt</u>		
-	Approx. 100 sources in this region	E
<u>7.18(11) Surface Coating Misc. Metal Parts</u>		
117/028	General Electric-Transformer, Pittsfield	B
042/705	Reed National, Westfield	B
<u>7.18(17) RACT</u>		
042/086	Monsanto Corp., Springfield	A
042/014	Spalding Corp., Chicopee	A
117/040	General Electric Co., Pittsfield	B

SUMMARY OF COMPLIANCE STATUS: SOUTHEAST REGION

<u>7.18(9) Cutback Asphalt</u>		
-	Approx. 75 sources in this region	E
<u>7.18(11) Surface Coating Misc. Metal Parts</u>		
120/142	Cornell Dublier, New Bedford	D
120/125	Foxboro Company, Foxboro	B
120/193	Larson Tool & Stamp, Attleboro	D
119/2353	Lite Control Corp., Hanson	D
119/2125	Masonelian Div., Avon	D
120/230	Sarama Lighting, Fall River	D
<u>7.18(14) Paper Surface Coating</u>		
119/1987	Vulpex Inc., Abington	B
<u>7.18(15) Fabric Surface Coating (16) Vinyl Surface Coating</u>		
120/040	Goodyear Tire & Rubber, New Bedford	B
119/7701	Shawmut Mills, W. Bridgewater	C
120/140	Coaters Inc., New Bedford (paper, fees, vinyl)	B
<u>7.18(17) RACT</u>		
118/2391	Boston Whaler, Norwell	C
118/2422	Boston Whaler, Rockland	C
120/101	Acushnet Co-Plant B, New Bedford	A
120/106	Globe Manufacturing, New Bedford	C
120/237	Storcroft Sailboat, Fall River	A

APPENDIX C

MASSACHUSETTS MOTOR VEHICLE INSPECTION
AND MAINTENANCE PROGRAM (I/M)



S. RUSSELL SYLVA
Commissioner

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Air Quality Control
One Winter Street, Boston 02108

July 12, 1988

Mr. Steven Perkins
Technical Services Branch
U.S. EPA ATS-2311
J.F. Kennedy Federal Building
Boston, MA 02203

Dear Mr. Perkins:

Enclosed please find the I/M Quarterly Audit Report for the 4th quarter (October 1, 1987 through December 30, 1987).

During the 4th quarter the Registry of Motor Vehicles (RMV) performed initial audits of 1030 emissions analyzers. In total, 120 analyzers failed the initial audit resulting in a failure rate of 11.7%. During this same period, the Division of Air Quality Control (DAQC) performed 53 reaudits of which 6 failed resulting in a 11.3% failure rate.

A complete analysis of the audit results along with a brief year-to-date audit summary can be found in the attached audit report. If you have any questions, please contact Gary Idleburg of my staff.

Very truly yours,

Barbara A. Kwetz
Acting Director
Division of Air Quality Control

BKM/GI:esl

Enclosure

C- Peter Kopanon, RMV

July 12, 1988

MASSACHUSETTS EMISSIONS ANALYZERS AUDIT
PROGRAM: 4th QUARTER REPORT
October 1, 1987 - December 30, 1987

The Massachusetts emissions analyzer audit program was implemented on April 1, 1986. The program is designed to measure the accuracy of the emissions analyzers in reading known concentrations of specific test gases which simulate automotive exhaust.

The audit program is an integral part of the overall quality assurance program for the state's vehicle Inspection and Maintenance Program (I/M). The program was developed by the Department of Environmental Quality Engineering (DEQE) with support and participation from the Registry of Motor Vehicles (RMV) and guidance from the U.S. Environmental Protection Agency. The RMV is responsible for initially auditing all state approved analyzers twice per year. DAQC is responsible for reauditing all analyzers that fail the initial RMV audit for HC and/or CO.

There are currently four emissions analyzers approved for use in the Massachusetts program: Allen Group Test Products Division, Bear Automotive, Hamilton Test Systems and Sun Electric Corporation. The attached report summarizes the results of audits performed during the fourth quarter of 1987 (October 1, 1987 through December 30, 1987).

During the 4th quarter of the Audit Program October 1, 1987 to December 31, 1987. the Registry of Motor Vehicles (RMV) performed 1030 initial audits. Of the 1030 analyzers audited, 910 passed and 120 failed resulting in a 88.3% pass rate and a 11.7% failure rate.

During the same period, The Division of Air Quality Control's Air Monitoring Section in Tewksbury performed 53 reaudits, including 1st and 2nd reaudits of the RMV initial audit failures.

INITIAL RMV AUDIT SUMMARY

INITIAL AUDITS	NUMBER PASS	PERCENT PASS	NUMBER FAIL	PERCENT FAIL
1030	910	88.3%	120	11.7%

DEQE REAUDIT SUMMARY

	NUMBER REAUDITS	NUMBER PASS	PERCENT PASS	NUMBER FAIL	PERCENT FAIL
1ST REAUDIT	47	41	87.2%	6	12.8%
2ND REAUDIT **	6	6	100.0%	0	100.0%
3RD REAUDIT	--	--	--	--	--
TOTAL REAUDITS	53	47	88.7%	6	11.3%

* See Appendix 1 for a listing of 4th quarter RMV Initial Audits

Of all audits performed in the 4th quarter, 21.34% of the Central region analyzers were audited, 38.77% of Met-Boston, 53.14% of the Northeast region, 35.24% of the Southeast region, and 77.19% of the Western region. Of the five regions, the Central region had the highest failure rate of 19.1%... ie, 17 failures out of 72 audits.

GEOGRAPHIC LOCATION OF AUDITS

RMV REGION	ANALYZERS /REGION	NUMBER OF AUDITS	ANALYZERS % AUDIT	NUMBER PASS	NUMBER FAIL	PERCENT FAIL
CENTRAL	417	89	21.34%	72	17	19.10%
M-BOSTON	583	226	38.77%	213	13	5.75%
NORTHEAST	557	298	53.14%	255	43	14.53%
SOUTHEAST	559	197	35.24%	167	30	15.23%
WESTERN	285	220	77.19%	203	17	7.73%
TOTAL	2401	1030	42.82%	910	120	11.67%

The failure rate for each manufacturer was 20% for Allen, 15.6% for Bear, 10.2% for Hamilton and 12.5% for Sun. The Allen failure rate was unusually high because of the small number of Allen analyzers that were audited (five).

MANUFACTURER'S SUMMARY

	NUMBER OF ANALYZERS	NUMBER AUDITS	NUMBER PASS	PERCENT PASS	NUMBER FAIL	PERCENT FAIL	% TOTAL FAILURES
ALLEN	26	5	4	80.0%	1	20.0%	0.8%
BEAR	440	211	179	84.4%	34	15.6%	27.5%
HAMILTON	1598	685	615	89.8%	70	10.2%	58.3%
SUN	337	129	112	87.5%	15	12.5%	13.3%
TOTAL	2401	1030	910		120	11.7%	100.0%

The source of information for the classification of analyzer repairs is the manufacturer signed Cease & Desist forms which indicate what repairs were performed. The majority of analyzer repairs were (NR) NOT REPORTED (70.8%).

'The Registry of Motor Vehicles (RMV) has been notified so that reporting will be more complete and efficient.

REPAIR CODES

AF=ANAL. FILTER	AT=ANAL. TIME/DATE	B=BENCH
D=ANAL. DOWN	EC=ELEC. CAL	EP=EXHAUST PROBE
LC=LEAK CHECK	O=OTHER	S=STAT. SUSPENDED
VS=VACCUM SWITCH	NR=REPAIR CODE NOT REPORTED	

REPAIR TYPE

REPAIR CODE	NUMBER	PERCENT OF TOTAL	ALLEN	BEAR	HAMILTON	SUN
AF	1	0.8%			1	
AT	9	7.5%	0	3	4	2
B	0	0.0%				
D	0					
EC	1	0.8%			1	
EP	0	0.0%				
LC	23	19.2%	1	11	8	3
O	1	0.8%			1	
S	0					
VS	0	0.0%				
NR	85	70.8%	0	20	55	10
TOTAL	120	100.0%	1	34	70	15

PAGE 4#####
FAIL ITEM SUMMARY

The majority of failures were due to the HCOO analyzer mechanisms (FAIL ITEM HCOO) being out of calibration for a total of 81.7% of all failures.

FAIL ITEM

FAIL ITEM	NUMBER OF FAILURES	PERCENT
HC	8	6.7%
CO	8	6.7%
HCOO	98	81.7%
DATE	6	5.0%
PRINTER	0	0.0%
OTHER	0	0.0%
N/A	0	0.0%
TOTAL	120	100.0%

The E.P.A currently only considers gas components(HC, CO) to be valid failure items. The initial failure rate involving these items was 11.1%.

INITIAL AUDITS	NUMBER PASS	PERCENT PASS	NUMBER FAIL	PERCENT FAIL	NON - GAS FAIL %
1030	910	88.3%	114	11.1%	0.6%

YEAR-TO-DATE AUDIT SUMMARY

The following tables represent the audit results from the period of April 1, 1986 to September 30, 1987.

CUMULATIVE AUDIT SUMMARY

INITIAL AUDITS	NUMBER PASS	PERCENT PASS	NUMBER FAIL	PERCENT FAIL
3844	3454	89.9%	389	10.1%

YEAR TO DATE AUDIT SUMMARY (1/87..12/87)

INITIAL AUDITS	NUMBER PASS	PERCENT PASS	NUMBER FAIL	PERCENT FAIL
1910	1710	89.5%	200	10.5%

DEQE REAUDIT SUMMARY

	NUMBER REAUDITS	NUMBER PASS	PERCENT PASS	NUMBER FAIL	PERCENT FAIL
1ST REAUDIT	304	265	87.2%	39	12.8%
2ND REAUDIT **	34	33	97.1%	1	2.9%
3RD REAUDIT	1	1	100.0%	0	0.0%
TOTAL REAUDITS	339	299	88.1%	40	11.9%

** Discrepancies between 1st reaudit and 2nd reaudit statistics are due to Date/Printer failures not being reaudited or analyzers not being operational(stations suspended).

APPENDIX D

MOBILE SOURCE INVENTORY INPUTS

TABLE D-1
CRUISE SPEEDS

Type of Movement	Speed in MPH	
	CBD	OBD
Left and right turns (in general)	15	15
Straight ahead with opposing left turn	20	25
Straight ahead without opposing left turn	25	30
Free flow with no interruption	30	40

CBD = Central Business District
OBD = Outside Business District

TABLE D-2
SPEEDS FOR MOBILE SOURCE INVENTORY

Region	Class:	U1	U2	U3	U4	U5	U6	U7	R1	R2	R3	R4	R5	R6	R7
Berkshire	--	45	42	32	32	29	27	55	45	42	--	40	28	26	
Franklin	55	55	42	32	32	29	27	55	54*	42	--	40	28	26	
Lower Pioneer	55+	42	39	29	25	25	21	55	55*	42	--	40	28	26	
Montachusett	--	51*	45*	32	32	29	27	55	54*	42	--	40	28	26	
Central	50	42	39	29	25	25	21	55	44	42**	--	40	28	26	
N. Middlesex	54	45	41	29	32	29	26	55	45	42	--	40	28	26	
Merrimack	55	45	41	34	32	33	29	55	44	38	--	40	28	26	
Metro. Area	50	45	39	32	32	29	27	55	44	38	--	40	28	26	
Old Colony	--	55	39	36	36	28	26	55	44	38	--	40	28	26	
Southeast	55	55*	55*	32	32	29	27	55	55*	42	--	40	28	26	
Cape Cod	--	53*	53*	--	32	29	27	--	44	42	--	40	28	26	
M. Vineyard	--	--	--	--	--	--	--	--	--	42	--	40	28	26	
Nantucket	--	--	--	--	--	--	--	--	--	--	--	40	28	26	

SOURCES: Unless otherwise noted, speeds are NECRMP data or inference therefrom, adjusted by DEQE on the basis of discussions with MDPW staff. Boston area values are areawide averages for Boston AQCR. Northern Middlesex, Merrimack Valley, and Old Colony values are county averages based on NECRMP surveys.

*55 mph Surveillance Study

**RPA Staff Surveys

+RPA travel time contour study

TABLE D-3

VEHICLE-TYPE DISTRIBUTION

Vehicle Type	Year	
	1982	1987
Light duty-gas(1)	76.9%	72.8%
Light duty diesel(1)	1.2%	5.4%
Light duty truck 1-gas(2)	8.7%	8.1%
Light duty truck 2-gas(3)	4.6%	4.6%
Light duty truck -diesel(2)(3)	0.2%	0.8%
Heavy duty truck - gas(4)	4.2%	4.2%
Heavy duty truck - diesel(4)	3.3%	3.3%
Motorcycle	0.9%	0.9%

Notes: (1) Automobiles

(2) Trucks used primarily for personal transportation with a gross vehicle weight between 0-6,000 pounds.

(3) Trucks used primarily for personal transportation with a gross vehicle weight between 6,001 - 8,500 pounds.

(4) Trucks and buses with a gross vehicle weight of over 8,500 pounds.

TABLE D-4

1980 STATEWIDE VEHICLE MIX FOR MOBILE SOURCE INVENTORY

Type	Class:	<u>U1</u>	<u>U2</u>	<u>U3</u>	<u>U4</u>	<u>U5</u>	<u>U6</u>	<u>U7</u>	<u>R1</u>	<u>R2</u>	<u>R3</u>	<u>R4</u>	<u>R5</u>	<u>R6</u>	<u>R7</u>
LDGV		.808	.842	.843	.841	.847	.840	.930	.776	.827	.839	-	.788	.820	.931
LDDV		.006	.006	.006	.006	.006	.006	.007	.006	.006	.006	-	.006	.006	.007
LDGT 1		.075	.078	.090	.087	.087	.092	.041	.089	.092	.092	-	.136	.102	.039
LDGT 2		.012	.013	.015	.014	.014	.015	.007	.014	.015	.015	-	.022	.017	.006
LDDT		.001	.001	.001	.001	.001	.001	.000	.000	.001	.001	-	.002	.001	.000
HDCV		.034	.026	.023	.030	.024	.022	.001	.030	.024	.021	-	.023	.024	.001
HDDV		.058	.028	.014	.012	.011	.008	.000	.076	.029	.016	-	.011	.010	.000
M, C		.006	.006	.008	.009	.010	.016	.014	.008	.006	.010	-	.012	.020	.016

Source: MDPW, adapted by DEQE.

TABLE D-5

VEHICLE AGE DISTRIBUTION

<u>Model Year</u>	<u>LDGV, LDDV</u>	<u>LDGT 1, LDDT</u>
1	.053	.106
2	.094	.102
3	.092	.075
4	.085	.112
5	.086	.129
6	.073	.093
7	.093	.087
8	.093	.064
8	.083	.061
10	.064	.020
11	.057	.031
12	.039	.020
13	.029	.021
14	.018	.020
15	.014	.016
16	.009	.013
17	.003	.009
18	.002	.007
19	.001	.006
20	.007	.008

SOURCES : Autos - R.L. Polk Company data for 1980, adapted by DEQE.
 Trucks - U.S. Census of Transportation, 1977, adapted by DEQE.

AMBIENT TEMPERATURES (°F) FOR MOBILE SOURCE INVENTORY

BOSTON AQCR		STATEWIDE	
<u>Hour</u>	<u>Temperature</u>	<u>Region</u>	<u>Temperature</u>
1	70	Berkshire	71
2	70	Franklin	71
3	70	Lower Pioneer	72
4	70	Montachusett	70
5	69	Central	71
6	69	N. Middlesex	70
7	69	Merrimack	70
8	69	Metro. Area	72
9	70	Old Colony	70
10	72	Southeast	74
11	74	Cape Cod	74
12	75	M. Vineyard	74
13	76	Nantucket	74
14	77		
15	77		
16	77		
17	77		
18	75		
19	73		
20	72		
21	71		
22	70		
23	69		
24	69		

Source: National Oceanic and Atmospheric Administration, Local Climatological Data, Monthly Summaries

TABLE D-7

START MODE PERCENTAGES FOR MOBILE SOURCE INVENTORY

STATEWIDE

<u>Region</u>	<u>Percentages (Noncatalytic Cold/ Catalytic Hot/ Catalytic Cold)</u>
Berkshire Franklin	26.9 / 31.0 / 34.4 (Figures for Berkshire)
Lower Pioneer	26.3 / 25.3 / 42.3 (Figures for Central)
Montachusett	17.5 / 21.8 / 28.9
Central	26.3 / 25.3 / 42.3
N. Middlesex Merrimack	17.5 / 21.8 / 28.9 (Figures for Montachusett)
Metro. Area	11.0 / 14.0 / 17.9
Old Colony	12.7 / 14.7 / 20.8
Southeast Cape Cod M. Vineyard	14.8 / 15.6 / 25.2 (Figures for Southeast)
Nantucket	40.0 / 30.0 / 50.0

Source: DEQE calculation from data supplied by regional planning agencies.

